Outcomes of an audiologic rehabilitation programme for working adults with hearing impairment who do not wear amplification

By

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He aha te mea nui o te ao?
He tangata! He tangata! He tangata!

What is the most important thing in the world?
It is people! It is people! It is people!

Maori Proverb

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ABSTRACT

Hearing impairment is a chronic health condition that affects increasingly younger age groups. Prevalence rates in the working population are estimated to be between four and nine percent when defined by audiometric loss, and between 30 – 40% when using self-report of hearing problems.

Hearing impairment can limit and threaten the social functioning of the affected person. It interferes with oral communication, causing activity limitations and participation restrictions. Additionally, a stigma is attached to hearing loss that can lead to feelings of embarrassment, guilt, anxiety and social exclusion. The stigma also poses a threat to the identity of the hearing impaired person who, in return, manages this threat by concealing or disclosing their hearing impairment depending on the social implications. As a consequence, help–seeking is delayed by a considerable amount of time. Although proven to be an effective intervention, amplification is often rejected by working adults.

Another available effective intervention is participating in audiologic rehabilitation (AR) programmes. These programmes focus on stigma reduction and communication strategies. Most existing programmes target an elderly population that had been fitted with hearing aids. No programme for working adults who do not wear amplification is published in the literature.

The new AR programme "See it! Hear it! Say it!" had been designed for adults who do not wear amplification and previously trialled in the USA. The purpose of this study was to evaluate the short and mid-term outcomes of a version adapted for the New Zealand context, specifically changes in health related quality of life (HRQoL) and cognitive anxiety.

Thirteen participants in two groups participated in the study. The design was a quasi–randomised pre-test/post-test/follow-up test with waitlist design. Outcomes were measured with the International Outcome Inventory – Alternative Interventions (IOI-AI), the Hearing Handicap Inventory for Adults (HHIA), the Cognitive Anxiety Scale (CAS) and a non-standardised online questionnaire.

Results demonstrated statistically significant differences between pre-group and follow-up assessment outcomes. Effect sizes ranged between 0.606 and 2.114. Participants reported implementing communication strategies in a number of adverse listening environments.

These findings provide evidence that the New Zealand specific version of "See it! Hear it! Say it!" is effective in improving HRQoL and reducing cognitive anxiety.

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LIST OF ABBREVIATIONS

4-PTA	Four frequency puretone average
ALD	Assistive listening device
AR	Audiologic rehabilitation
ASHA	American Speech and Hearing Association
CAS	Cognitive Anxiety Scale
CEO	Chief executive officer
CPH	Communication Profile for the Hearing Impaired
CVC	Consonant – Vowel – Consonant
dB	Decibel
dB HL	Decibel Hearing Level
HATS	Hearing assistance technology system
HHI	Hearing Handicap Inventory
HHIE	Hearing Handicap Inventory for Elderly
HHIA	Hearing Handicap Inventory for Adults
HHIA Emotional	Emotional subscale of the HHIA
HHIA Social	Social subscale of the HHIA
HHIA Total	All areas of the HHIA combined
HPL	Half-peak level
HRQoL	Health related quality of life
ICF	International Classification of Functioning, Disability, and Health
IOI-AI	International Outcome Inventory – Alternative Interventions
kHz	Kilohertz
NZAS	New Zealand Audiological Society
QuickSIN	Quick Speech-In-Noise test
P-I-curve	Performance – intensity – curve
PTA	Puretone average
SD	Standard deviation
SF-36	Short Form Health Survey
SNR	Signal-to-noise ratio
WHO	World Health Organisation

1. INTRODUCTION

Working adults with hearing impairment often choose not to take up amplification. Group audiologic rehabilitation (AR) programmes have been shown to be an effective alternative intervention to amplification. No AR group programme for working adults with acquired hearing impairment who do not wear amplification has been published for the New Zealand context.

1.1 Hearing Impairment

Hearing impairment is a chronic health condition that can best be understood in the context of the conceptual framework of the International Classification of Functioning, Disability, and Health (ICF) of the World Health Organisation (World Health Organization, 2001). In this framework, a health condition is defined as the product of three different components and their interactions: body structure and functions, activities and their limitations, and participations and their restrictions. Additionally, two contextual factors interact with any of these components, namely environmental factors and personal factors. The combination of all five aspects produces a very individual experience of the health condition for each person.

In order to follow this classification, the term “hearing impairment” will be used in this thesis - instead of “hearing loss” -, wherever it relates to limitations of the sensory organs unless it is a direct quotation. Terminology for a person seeking or receiving services ranges in the literature from “patient”, over “client” to “consumer” and “customer.” Each term reflects a different health system and service delivery concept. “Patient” was rejected for this thesis as it did not reveal the amount of self-determination that service seekers routinely display. “Consumer” and “customer” were rejected as they implicated a private health system which was only partially applicable for the New Zealand context. As a compromise, the term “client” was chosen.

Some terminology will be used which reflects previous health and disability concepts. “Hearing disability” or “hearing handicap” are terms that were commonly used to describe activity limitations and participation restrictions resulting from hearing impairment. In particular, “hearing handicap” is a construct that is used in the Hearing Handicap Inventory for Adults (HHIA; Newman, Weinstein, Jacobson & Hug, 1990) and lives on in research literature each time the questionnaire is used as an outcome measure - despite becoming historic terminology.

Hearing impairment can be caused by genetic or environmental factors, accidents or age-related deterioration, and is experienced as reduced audibility of sound. A number of anatomical structures can be involved in the loss of hearing sensitivity such as the outer ear, the middle ear, the inner ear, cranial nerves or parts of the brain. Problems in the outer, middle and inner ear are often called peripheral losses, while central losses indicate involvement of brain structures.
Peripheral losses are further divided into conductive, sensorineural or mixed losses. Conductive hearing impairments originate from disturbances in outer and middle ear systems and often, it is possible to treat them medically. The sources of sensorineural impairments are the cochlea and the VIIIth cranial nerve; these impairments tend to be irreversible (Black, 1999; Schlauch & Nelson, 2009).

Loss of hearing sensitivity is classed into grades of severity. There is a certain disagreement between researchers about classification and boundaries of these grades. Goodman (1965) defined the grades of hearing impairment as normal (< 25 dB HL), mild (26 – 40 dB HL), moderate (41 – 55 dB HL), moderately severe (56 – 70 dB HL), severe (71 – 90 dB HL), and profound (> 90 dB HL). Clark (1981) introduced an additional grade with slight (16 – 25 dB HL) hearing impairment, aimed especially at the paediatric population.

Additionally to loss of hearing sensitivity, changes in central processing can lead to reduced audibility in quiet and background noise (Chisholm, Willott & Lister, 2003). Aging is the most common factor for slowing of central processing; in turn, this can lead to problems in difficult listening situations such as background noise, even if puretone thresholds fall in the normal range (Kim, Frisina, Mapes, Hickmann & Frisina, 2006; Banh, Singh & Pichora-Fuller, 2012).

1.1.1 Prevalence rates in the work force

Statistics New Zealand published a report about disabilities and workforce (15 years and over, living in private households, 2008), but grouped sight and hearing impaired persons together into one category of sensory disability. The report stated that 75% of people with sensory disabilities participated in the labour force, and that sensory disabilities represented the most common disability in the labour force. The unemployment rate of this group was 4%, close to the rate of the non-disabled population. In another report (Greville, 2005) a prevalence rate of hearing loss in the workforce of 4.6% was stated. In this report, however,

persons whose hearing was "corrected" by hearing aids were not considered as being hearing impaired. For this reason, it is assumed that the stated hearing impairment prevalence rate is underreported. 47% of adults with hearing impairment were described to be participating in the workforce (either employed or seeking work) and 5.3% were unemployed.

Data from other industrialised countries might be transferable to New Zealand on the assumption that age related hearing impairment follows a similar pattern across countries. Due to introduction of different legislation regarding occupational hearing protection in various industrialised countries, prevalence rates might differ for noise-induced hearing impairment. However, reliable data regarding prevalence rates of hearing impairment in the work force are scarce. Ruben (2000) reported that five to ten percent of the work force in the United States are estimated to have a communication disorder (impaired hearing, language and/or speech). Ikeda, Murray and Salomon (2009) reported a prevalence rate of bilateral hearing impairment in the United States between four and nine percent for adults aged 20 – 69 years. Kochkin (2009) estimated higher prevalence rates for the same age range. He reported that 16% of adults living in the United States in that age group have a hearing impairment of at least 25 dB HL in the speech frequencies and that the prevalence increased to 31% when high frequency impairments were included.

The incidence rate of hearing impairment increases with age. Cruickshanks et al. (2003) found that 11% of adults without hearing impairment in the age group of 48 – 59 years will develop a hearing impairment (four-frequency-puretone-average (4-PTA) in any ear > 25 dB HL) within five years, while in the age group 60 – 69 years, 23% develop a hearing impairment within the same time period. Considering the current debate about raising the age of retirement, these age groups might be increasingly represented in the working population.

Prevalence rates of hearing impairment are higher when self-report is used instead of medical or legal definitions. Hannula, Bloigu, Sorri Majamaa and Mäki-Torkko (2011) found in an epidemiologic study that 37% of participants aged 55 – 66 years reported having hearing problems while only half of those participants met the defined criteria of hearing impairment (4-PTA better ear > 20 dB HL). Chia et al. (2007) found a similar result in the Blue Mountain Hearing Study, with 51% of the participants aged 49 years and older reporting hearing problems, while only half of these 51% met the criteria of hearing impairment (4-PTA any ear > 25 dB HL). Overall, between 35 and 45% of adults over the age of 50 years report to be affected by hearing impairment (Cruickshanks et al., 1998).

1.1.2 Effects of hearing impairment

Effects of chronic health conditions on individuals and their families have various components: they can impact physical, psychological, social, vocational and economic functioning (Livneh & Antonak 1997). Apart from the sensory loss, persons with hearing impairment are confronted with numerous psychosocial consequences (Karlson Espmark, Rosenhall, Erlandson & Steen, 2002).

The psychosocial consequences of hearing impairment are well documented. In the terminology of the previously discussed model of WHO (2001), hearing impairment often results in activity limitations and participation restrictions. As a consequence, psychological well-being and health related quality of life (HRQoL) are negatively impacted by hearing impairment (Helvik, Jacobson & Hallberg, 2006; Chia et al., 2007). A stigma attached to hearing impairment plays a big role forming these psychosocial consequences (Hétu, 1996).

1.1.2.1 Health Related Quality of life

Hearing impairment has been related to poorer quality of life and well-being (Helvik, Jacobson & Hallberg, 2006; Chia et al., 2007; Hallberg, Hallberg & Kramer, 2008), poor self-esteem, anxiety and depression (Caraballese et al., 1993; Ormel et al, 1997; Maggi et al., 1998; Hindley & Kitson, 2000; Tambs, 2004), and social isolation (Weinstein & Ventry, 1982; Hétu, Jones & Getty, 1993; Radcliffe, 1998; Resnick, Fries & Verbrugge, 1997; Nicholson, 2012).

The impact of hearing impairment on HRQoL has been well documented in recent years. The studied age range generally targets retired generations, or ‘the elderly’ (Stumer, Hickson & Worrall, 1996, Gates, Murphey, Rees, Fraher, 2003, Chia et al, 2007). The effects of hearing impairment on quality of life in this age group might differ from the experiences of working adults. Tambs (2004) compared the impact of hearing impairment on mental health between three age groups (20 – 44 years, 45 – 64 years, and 65+ years). The impact of hearing impairment on mental health measures was stronger in the younger and middle aged groups, while it was lowest in the oldest age group. These results indicated that there might be higher acceptance of the impact of hearing impairment in the older age group, as it was expected and considered ‘normal.’ As mild hearing impairment in the younger age groups impacted more on the mental well-being than severe losses, the author speculated that the experience of acquiring a gradual hearing impairment over time is more painful than living with a severe,

innate hearing impairment.
In another study supporting the results above, Helvik, Jacobson and Hallberg (2006) showed that psychological well-being was unrelated to level of hearing impairment and education, but related to age and gender. Women and younger adults showed a higher degree of anxiety, depression, less self-control, general health and vitality than men and adults of older age in this situation. A lower degree of psychological well-being was positively correlated to activity limitations and participation restrictions.
It can be concluded that, in younger adults, HRQoL and mental well-being are stronger impacted by acquired hearing impairment than in older adults.

1.1.2.2 The stigma of hearing impairment

The physical impairment is often a gradual onset of loss of hearing sensitivity. Hétu (1996) stated that due to the absence of pain or of internal reference to hearing sensitivity, it might take a number of years for individuals to realise that they have a hearing impairment. Instead, functional limitations of hearing impairment are only revealed in interactions with others, which gives the hearing impaired person a first indication that they are overstepping a social boundary (Hindhede, 2011).

This overstepping of social boundaries can result in a stigmatisation process. Hétu (1996) described how the physical limitations of hearing impairment can cause disturbances in oral communication on the micro-process level. The hearing impaired person is seen as acting inappropriately by seemingly ignoring communication requests, talking in a loud voice or asking for undue repetitions. The reaction to inappropriate communication behaviour is blame and anger, which triggers embarrassment in the hearing impaired person. With time and repeated occurrences, the hearing impaired person develops feelings of shame, resentment or guilt. This leads on the macro-process level to a growing awareness and embarrassment in the person of their shortcoming: their hearing impairment. This awareness can lead to self-stigmatisation, with the hearing impairment being seen as sign of weakness and failure. In return, self-stigmatisation heightens the awareness of perceived public opinion on deafness or hearing impairment, leaving the hearing impaired person with a feeling of being excluded. Finally, the awareness of the impairment can trigger anxiety about unpredictable communication outcomes. In response to the anxiety, the hearing impaired person might avoid difficult listening situations. This behaviour helps to save face, but also leads to social isolation.

Hétu (1996) stated that 'normalisation' needs to take place in order to re-instate someone's social identity. By joining a group of peers and sharing their experiences, the feelings of shame and guilt, and with it the pain of having a 'spoilt' identity (Goffman, 1963), are exposed as a common experience and lose their power over the individual. The members experience support, empathy and belonging, all of which were threatened by the stigma. In a second step, the group members take their new knowledge and newly acquired self-esteem out into their normal lives and explain their limitations to communication partners. By getting knowledge of limitations, the communication partners are offered a chance to make accommodations and re-instate the social integrity of the stigmatised person. The success of the second step depends partly on how comfortable the hearing impaired person is within themselves, and partly on how persistent the stigma is in that particular social environment.

1.1.2.3 Stigma-induced identity threat

Building on this concept of social stigma, many authors have explored the topic in recent years. The stigma related to hearing impairment 'spoils' (Goffman, 1963) or threatens the identity of the hearing impaired person (Hogan, 1998; Roberto & McCann, 2010; Hindhede, 2010; Hindhede, 2011). Southall, Gagné & Jennings (2009) applied the model of stigma-induced identity threat (figure 1.1; Major & O'Brien, 2005) to individuals with acquired hearing impairment. According to this model, a stigmatising event can threaten a person's construct of identity. The amount of threat experienced is dependent on: (1) personal characteristics such as age, gender, personality, cultural identity, or religious beliefs; (2) situational cues, such as the physical or social environment which can make events more or less threatening to someone's identity; and (3) collective representations which are shared understandings or beliefs about stigmatising conditions. When experiencing a stigmatising event, the person appraises the threat and reacts with volitional and non-volitional responses. The outcome of the responses feeds back into the next appraisal of identity-threat. Over time, the outcomes of the responses to the identity threat might also influence collective representations.

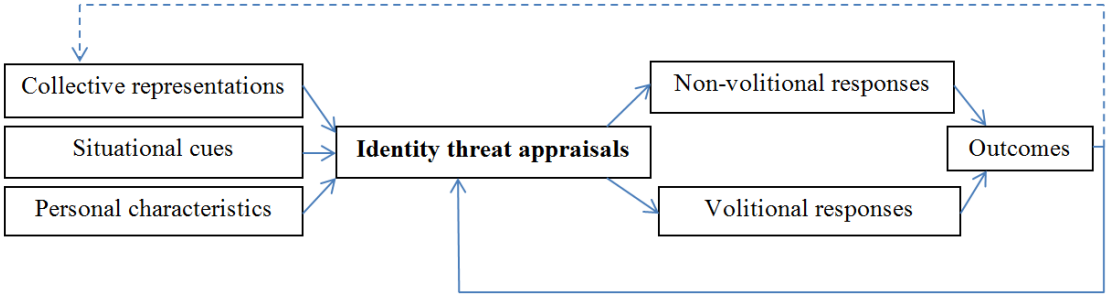


Figure 1.1: Stigma-induced identity threat (Major & O'Brien, 2005)

In the context of hearing impairment, collective representations, or shared believes about hearing impairment could be seen in the historic stereotype of 'deaf and dumb' (Stephens, 2006). The stigma of hearing impairment evolved out of this stereotype and was intensified by the emerging standardisation of 'normal' anatomy, physiology and body functions in modern medicine (Foucault, 1998). Today, the historic stereotype is manifested in the 'hearing aid effect' (Blood, Blood & Danhauer, 1977). The 'hearing aid effect' is thought of negative attitudes and stereotypes that are projected onto a person wearing a hearing aid. Although newer research (Cienkowski & Pimentel, 2001) suggested that young adults do not judge hearing aid wearers as less intelligent, evidence of stigma was still present. More than half of the study participants would be concerned being seen wearing hearing aids, and a third would be embarrassed.

In the context of identity threat appraisals, situational cues relate to physical and social environments. Similar encounters can become more threatening in some situations than others, depending on the social and physical situation. In a study about disclosing hearing impairment in the workplace, Southall, Jennings and Gagné (2011) reported that situational cues, such as responsibility for a meeting or a job interview, were perceived as threatening social situations because hearing impairment could be seen as jeopardising the professional role.

The individual factors that influence the outcome of the identity threat appraisal have directly and indirectly attracted a lot of research. For example, Erler and Garsecki (2002) studied the stigma perception of women within different age groups. Younger women reported experiencing a greater stigma than older women. These findings corresponded with the findings of Tambs (2004), as discussed previously, that impacts of hearing impairment, are

felt stronger by individuals in younger age groups than in older age groups. Personal factors will be addressed in more detail in section 1.1.2.5 about help-seeking behaviour.

Southall, Gagné & Jennings (2009) suggested that educating clients about the model of stigma-induced identity threat might help them to understand the stigmatisation process and their own non-volitional stress responses. The model was seen as a useful complement and theoretical background to Hétu's normalisation process.

1.1.2.4 Identity management

Confronted with the threatening diagnosis and psychosocial impacts of hearing impairment, individuals have to re-assess their own social roles and identities. The stigma of hearing impairment leads to a reluctance to acknowledge the hearing impairment. There is also a lack of socially available positive disabled identities. Hindhede (2011) found that persons with acquired hearing impairment felt that hearing impairment was a betrayal by their bodies of their inner youth, stating that hearing impairment represented an older body image than they identified themselves with. The hearing impairment revealed their own senescence and forced adjustments on them that were socially undesirable. The fact that hearing impairment is invisible offered participants the possibility of concealing it, attempting to pass as a person with normal hearing. In particular, in the 'grey' zone of mild and moderate hearing impairment, this strategy might work successfully. However, depending on the severity of the hearing impairment, this strategy produced considerable strain, stress and anxiety in the hearing impaired person in the face of the possibility that the hearing impairment is discovered. The decision to hide the hearing impairment was driven by shame and embarrassment; the negative consequences of disclosing the hearing impairment were seen as outweighing the strain and anxiety produced by keeping up a normal hearing appearance. Although a lot of energy was used to avoid stigmatisation through disclosure, concealing hearing impairment sometimes came at the cost of taking up an 'odd' or 'social incompetent' social role when communication rules were inadvertently broken. However, an 'odd' social role was more tolerable for some individuals than carrying the stigma of hearing impairment (Hindhede, 2011).

Scambler (2009) stressed the individual scope of variation in the impact of stigma. While some individuals can control and contain the threat, others feel that stigma invades all aspects of their biography and identity.

The choice to conceal or disclose hearing impairment is reassessed in many social interactions and used to manage one's identity. Southall, Jennings and Gagné (2011) found that workers managed their identities according to five relevant themes: (1) the perceived importance of the situation, mainly influenced by their perceived responsibilities in the situation and the costs or benefits of disclosure, (2) the perceived sense of control, a combination of predictability of work related communication outcomes and power balance between self and co-workers, (3) the community affiliation, or social cohesion at the workplace which can be threatened through disclosure to prejudiced co-workers; but even more sympathetic co-workers were found to lack understanding of the impact of 'partial hearing loss,' (4) burden of communication, manifested through the perception that co-workers seem to forget about the hearing impairment and the perception that clarification requests might be disruptive to the natural flow of social interactions, and (5) co-existing issues related to hearing impairment such as fluctuating hearing levels and adaptive technologies. While some workers were anxious to hide their hearing aids, others enjoyed the fact that the visibility of the aids did the disclosing for them.
The authors pointed out that "our respondents routinely thought about disclosure of hearing loss and strategized how to control information flow about their hearing loss" (p. 705) when a co-worker forgot about their hearing impairment, a new situation arose or a new person entered the scene.

Disclosure of hearing impairment and managing one's identity is not a one-off event, but a 'repetitive iterative process' (Ward & Winstanley, 2005). Even if the choice for non-disclosure is made, hearing impairment tends to reveal itself through recurring communication breakdowns, 'outing' the person in the process.

1.1.2.5 Help-seeking behaviour

Seeking services for hearing impairment is a difficult personal process which is often delayed for up to 10 years (Davies, Smith, Ferguson, Stephens & Gianopoulos, 2007). In light of previously discussed points regarding hearing impairment, stigma, stigma-induced identity threat and identity management, it might not be surprising that the majority of adults with hearing impairment refrain from seeking professional help. In a population study of participants 57 years and older, van den Brink, Kempen and van Heuvelen (1996) found that 53% of adults who met the criteria of hearing impairment (4-PTA ≥ 35 dB HL) did not seek services. Compared with their peers who had a similar hearing impairment but used hearing

aids, the non-help-seekers had lower self-perceived hearing disability and hearing handicap, saw less benefit in using hearing aids and experienced less social pressure from their significant communication partners. 45% of the non-help-seekers felt that their hearing impairment did not interfere with their social life, while only 4% of the hearing aid users felt it did.

Similar observations were made by Laplante-Lévesque et al. (2012) in a study of adults with acquired hearing impairment on help-seeking and rehabilitation. The reasons listed by non-help-seekers for not seeking services were given as lack of time and money, the perception that their hearing impairment was not bad enough for hearing aids, and concerns about appearance and functionality of hearing aids.

The decision to seek services is often made only under social pressure from communication partners (Hindhede, 2010; Claesen & Pryce, 2012). Interviews with first time service-seekers found that clinical services were sought out not with the primary goal of acquiring hearing aids, but to appease the social environment. Stereotypes and stigma perception of the help-seekers seemed to get amplified by the upcoming first appointment, with hearing aids being described as signs of aging, being the equal to continence pads, seen as the last resort or even taken as reason for divorce (Claesen & Pryce, 2012). The possibility of being confronted with an identity threatening diagnosis seemed to cause a significant amount of anxiety in the participants. In their interviews, they magnified all negative traits and stereotypes attached to hearing impairment in order to distance and protect themselves from the identity threat these characteristics posed.

A number of researchers have attempted to measures this anxiety with mixed results. A number of researchers found that anxiety levels were correlated to the perception of hearing handicap (Anderson & Green, 1995; Saunders & Cienkowski, 1996) and that anxiety accounted for some of the variance that is found in the social and psychological effects of experiencing difficult listening environments (Gatehouse, 1994). These studies used self-report measures that presumed that anxiety was a character trait of the participant and operationalised anxiety as “trait anxiety.” A study by Kelly, Neimeyer and Wark (2011) researched anxiety in different stages of help-seeking from a different perspective, as situational “state anxiety” instead of character-based “trait anxiety.”
Cognitive anxiety is a concept that was developed in Personal Construct Theory (Kelly, 1955). In this theory, people are thought of developing construct systems of self and others by constantly appraising social interactions. A sense of control is achieved by successfully

predicting outcomes. A transient state of cognitive anxiety is experienced when the individuals are not able to predict events they encounter or when the implications of these events are not clear. In the context of hearing impairment, examples of events causing cognitive anxiety could be unpredictable communication outcomes due to difficult listening environments, wrong appraisals of social interactions due to hearing impairment or unexpected occurrences of blame and anger as the hearing impaired person inadvertently brakes established rules of oral communication.

The results of the study by Kelly et al. (2011) showed that the highest level of cognitive anxiety was experienced in the help-seeking group before the first clinical appointment, paralleling the stigma-induced identity threat seen in participants of Claesen and Pryce (2012) before their first clinical appointment. A medium level of cognitive anxiety was measured in a non-consulting group. This level of cognitive anxiety seemed to be constant and could be interpreted as a certain level of uncertainty about the results of social interactions due to the untreated hearing impairment. The lowest cognitive anxiety was displayed by hearing impaired adults four weeks after their first consultation. These participants had been fitted with hearing aids and were receiving information about effective communication. The low levels of cognitive anxiety in this group could reflect a higher sense of control, being able to appraise and predict social interactions more successfully than before.

Help-seeking is not a routine process, but so deeply challenging to the personal construct of identity that most hearing impaired adults choose not to do it. If services are sought, then it is mainly done to fulfil social obligations towards the main communication partners. Stigma of hearing impairment and stigma-induced identity threat are major obstacles in seeking services for hearing impairment.

1.2 Management of hearing impairment

1.2.1 Management decisions

As pointed out previously, hearing impairment is a chronic health condition. A minority of hearing impairments have causes that can be treated medically; all other cases are managed with rehabilitation.

Looking at rehabilitation of other chronic health conditions, there is a wealth of research on management strategies. Due to the long term nature of the conditions, client involvement and

self-management plays an important part in management of chronic conditions. Paternalistic and acute health care models are replaced with a shared decision-making approach. In chronic medically uncomplicated conditions like hearing impairment, clients make management choices and revise them repeatedly to suit their changing needs (Montori, Gafni & Charles, 2006). Only a minority of the management decisions will be made in the clinical encounter. Most decisions are made in the client's everyday life without involvement of clinicians.

In a review of rehabilitation interventions for older adults with hearing impairment, Laplante-Lévesque, Hickson and Worrall (2010a) found that shared decision making was not commonly embraced in clinical interventions. The three main intervention options were: (1) hearing aids, (2) hearing assistance technology systems (HATS), also called assistive listening devices (ALD), and (3) communication programmes, also known as audiological rehabilitation (AR) programmes. The availability, uptake and adherence of these interventions varied to a great degree.

While hearing aids are widely available, the average hearing aid adoption rate is approximately 25% (Kochkin, 2009); that means only 25% of adults who report hearing difficulties actually own hearing aids. When broken down into age groups, the population in the working age has even lower adoption rates than the average: in the age group of 55 – 64 year olds, the adoption rate is 16.7%, the 45 – 54 year olds have an adoption rate of 11.2% and the 35 – 44 year olds have an adoption rate 10.7%.

These low adoption rates of hearing aids have not changed between 1984 and 2008, although over this time period, technology has changed considerably from analogue to digital hearing aids (Kochkin, 2009). This fact might be due to the previously discussed points of stigma and stigma-induced identity threat. Hindhede (2011) pointed out that provision of hearing aids is meant to restore 'normality' in communication situations for the wearer. However, the hearing aid makes a previous invisible disability visible "in a way that might draw attention to the very disability that the technology was developed to disguise" (p. 176).

There are signs that hearing aid adoption rates do not reflect adherence rates accurately. Adherence rates are calculated as a percentage of all persons who took up using hearing aids minus the persons who decided to stop using them. Of the 25% of hearing impaired adults who own hearing aids, a large number (13 – 23%) still opts not to wear them (Erler & Gerstecki, 2002; Chia et al, 2007; Kochkin, 2009).

HATS are widely available. Prendergast and Kelly (2002) reported that 80% of audiologist in

the United States provided information about HATS. Tomita, Mann and Welch (2001) reported that 5% of older Americans owned hearing assistance technology, while in Québec, Canada, it is estimated that 15% of older adults with hearing impairment use HATS (Southall, Gagné & Leroux, 2006). No data regarding adherence rates have been published. AR programmes are only offered by 5% of all audiologists in the United States (Prendergast & Kelley, 2002). For their audiological rehabilitation group programme, Hickson, Worrall and Scarinci (2007) reported an adherence rate of 56%. Sweetow and Henderson-Sabes (2006) report an adherence rate of 68% to their individual communication programme.

From the intervention choices given, individuals will consider their own situation and decide on the most suitable option for them, including choosing to do nothing. Laplante-Lévesque, Hickson and Worrall (2010b) found seven categories of factors that influence this decision: (1) convenience of the intervention, (2) expected adherence and outcomes, (3) financial costs, (3) self-perceived hearing disability, (4) the nature of the intervention, (5) other people's experiences, (6) recommendations and support, and (7) preventative and interim solutions. Depending on the individuals, each category could be seen as a negative or positive influence on their decision process.

It can be concluded that rehabilitation decisions are highly complex and different for every individual. Therefore, it is important for the health professional to be able to offer a number of different rehabilitation options to their clients. Interventions should not only address the bio-medical dimension of audibility, but also psychosocial dimensions of HRQoL and stigma-induced identity threat. The psychological pain of having a 'spoiled' identity (Goffman, 1963) can interfere with choosing the most effective rehabilitation option (Hétu, 1996).

1.2.2 Hearing aids

Hearing aids have been documented to be an effective rehabilitation method to reduce the activity limitations and participation restrictions associated with hearing impairment (Malinoff & Weinstein, 1989; Newman, Jacobson, Hug, Weinstein & Malinoff, 1991; Newman & Sandridge, 1998, Primeau, 1997, Stark & Hickson, 2004).

Traditionally, hearing aid benefit was measured as improvements in clinical speech recognition tests. Gatehouse (1995) pointed out that these measures only assess the dimension of physical impairment, but not the auditory handicap/disability, or, as previously

discussed by van den Brink, Kempen and van Heuvelen (1996), the self-perceived hearing disability. As a consequence, Gatehouse proposed a battery of benefit measures, combining self-assessment questionnaires with clinical tests, disability and benefit interviews.

A task force group of the American Academy of Audiology reviewed the research regarding evidence of the health-related quality of life (HRQoL) benefits of hearing aids (Chisholm et al., 2007). They found robust improvements after hearing aid fitting in the psychological, social and emotional well-being when measured with disease specific instruments such as the Hearing Handicap Inventory for the Elderly (HHIE; Ventry & Weinstein, 1982). Using generic quality of life instruments, these benefits were not observed. This difference was most likely due to the lack of questions regarding hearing and oral communication in the generic quality of life questionnaires (Abrams et al., 2005). Overall, the authors judged the evidence for hearing aids improving HRQoL only as “good” instead of ”excellent”; this was due to the fact that most studies they reviewed were done as quasi-experimental studies instead of randomly controlled and double blinded.

Although HRQoL levels were improved with hearing aids, questions remain over the origins of these improvements. Some improvements will be achieved by restoring audibility, but others aspects, such as managing challenging listening environments, need to be learnt by the user. Fitting protocols for hearing aids focus on the technological perfection of the fitting, and therefore only on audibility (American Speech-Language-Hearing Association, 1998; New Zealand Audiological Society, 2012a). Counselling clients about listening environments, signal-to-noise ratio (SNR) or using visible cues of speech is not part of fitting protocols.
In a comparison study by Chisholm, Abrams and McArdle (2004), participants were fitted with hearing aids using American Speech-Language-Hearing Association (ASHA) protocols (1998). In addition, half of the participants took part in a group AR programme. In this AR programme, participants learned about listening environments, communication strategies and community resources. The participants in the AR group showed short term benefits in their communication profile that the control group did not achieve. However, in the long term follow-up after one year, the participants of the control group had improved their scores to match the participants who took part in the AR group programme. Although some benefit was caused by improved audibility, the additional short-term benefit gained in the AR group over the control group was due to knowledge about listening environments and communication strategies. As the members of the control group improved their scores over the timespan of one year to the same levels as the members who took part in the AR group, it

might be speculated that over one year, the control group learned by trial and error about communication strategies and listening environments.
It can be concluded that hearing aids improve HRQoL by enhancing audibility. Additional improvements can be achieved when clients use communication strategies in combination with their hearing aids.

1.2.3 Hearing assistance technology systems

Hearing assistance technology systems (HATS) are systems that enable reception of auditory speech and non-speech signals. Technically speaking, hearing aids should be included in the term HATS, but in common practice they are not. HATS include personal and communal technologies that increase the signal-to-noise ratio (SNR), amplify the auditory signal, or translate it in visual or tactile signals (Thibodeau, 2009). They are usually divided into five categories: (1) one-on-one communicators, (2) television devices, (3) telephone devices, (4) alerting devices, and (5) group listening systems (Southall, Gagné & Leroux, 2006). HATS can be used in combination with hearing aids or by themselves. The most common devices are amplified phones, flash lights for telephone and door bell, vibrator alarms, TV earphones and induction loops. FM systems, based on radio waves, are the most common device to improve SNR in educational settings (Thibodeau, 2009).

As HATS are not widely used, little research into their effectiveness is published. There is, however, research into factors that influence adults to adopt HATS. Southall, Gagné and Leroux (2006) interviewed a group of HATS users to identify the factors that influenced their use of HATS. The authors reported the following factors: prompters, accessibility, attitudes, technology and expected/actual benefits. Each factor had a facilitating and an impeding aspect to it. The authors developed a model of successful adoption of HATS. First, the person needs to recognise their hearing difficulty and develop awareness of available technology, then seek consultation and acquire HATS, and finally adapt their behaviour to the device to receive benefit from the technology. The authors pointed out that this process might need to be repeated a number of times to adapt the intervention to the changing needs of the hearing impaired person.

This circular assessment and re-assessment of needs reflects the self-management model of chronic health conditions. HATS are excellent devices for self-management of hearing

impairment. However, stigma and stigma-induced identity threat might work against the adoption of HATS in the same way as they do with hearing aids.

1.2.4 Audiological rehabilitation programmes

Another intervention option is participating in audiological rehabilitation (AR) programmes. These programmes are foremost designed to reduce stigma and stigma-induced identity threat by facilitating the normalisation process (Hétu, 1996) through provision of information, training and psychosocial support. AR programmes encourage persons with hearing impairment to engage in the rehabilitation process and promote self-management of their hearing impairment.

1.2.4.1 Characteristics of AR programmes

Unlike hearing aids, no standardisation protocols exist for design or delivery of AR programmes. Consequently, there is a wide variety of formats, facilitators, facilitation styles, theoretical frameworks, class contents, class frequencies and target audiences of AR programmes.

AR programmes have been proven to be effective in group or individual formats (Hawkins, 2005; Sweetow & Palmer, 2005). Some researchers call individual programmes 'auditory training' and distinguish them from group programmes (Brouns, El Refaie & Pryce, 2011). These auditory training programmes focus historically on individual listening exercises, aiming to improve speech perception. For the purpose of this thesis, these auditory training programmes are included in the review and referred to as individual AR programmes.
The advantage of an individual programme is contents can be individualised and the delivery pace can be adjusted to the person. Due to the associated costs with individual training, computer based programmes have been developed and have been proven to be effective (Sweetow & Henderson-Sabes, 2006). Group programmes, on the other hand, are still more cost effective and offer peer interaction that is central in the normalisation process (Hétu, 1996). In a study by Preminger and Yoo (2010), the participants of AR groups reported that they received "benefit from being with others who had hearing loss, from learning how others with hearing loss cope, and from understanding the feelings of others with hearing loss" (p. 118). This normalisation effect might not be achieved with individual AR programmes. However, Laplante-Lévesque, Hickson and Worrall (2010) showed that some persons preferred individual programmes due to their own personalities and time allocations.

Therefore, although group programmes might be preferable to individual programmes due to the peer support effect, it might be important for clinicians to offer both choices.

The facilitator of AR programmes can be a clinician or alternatively, in a self-help setting, a hearing impaired peer. In individual programmes, increasingly no human interaction is needed as the training is delivered by a computer programme. The setting can be in a private or public clinic, or public meeting rooms for self-help groups (Barlow, Wright, Sheasby, Turner & Hainsworth, 2002).

Depending on the theoretical background of the author, the facilitation style of AR group programmes can vary. Some publications call their AR group programmes 'counselling based' (Hawkins, 2005), stressing the inner process of changing identity and self-perception during the programme. Other publications describe their programme as 'educational based', focussing on the new knowledge that is acquired (Preminger & Yoo, 2010). In the literature discussing chronic illness, the terms 'psychosocial' or 'psycho-educational' groups are used (van der Ven, 2003; Chujo et al, 2005; Duman, Yildirim, Ucok, Er & Kanik, 2010). Kelly-Campbell (in press) found in her research for the present AR programme that clients preferred an 'educational based' programme. A possible explanation for this preference is that the term 'counselling' is commonly associated with mental health counselling. In the context of stigma-induced identity threat, hearing impaired persons might want to distance themselves from connotations of needing psychological help.

The theoretical framework and content of AR programmes is often not described in research publications. This could be due to commercial interests or space restrictions of the publishers. Hétu and Getty (1991) provided much detail about, and theoretical background for their AR programme. They worked within the theoretical framework of the health education model, in which the affected person acquires new knowledge about their condition and is led to adopt a new behaviour. The three aims for the programme were: (1) offer psychosocial support, (2) allow understanding of nature and consequences of hearing impairment, and (3) develop new skills for coping. The first objective was met by sharing experiences and encouraging peer group support. The second aim was met by giving oral and written information about the auditory system, noise damage, the associated hearing disabilities, audiological representation of hearing impairment, stress resulting from noise exposure and tinnitus. To address the third objective of learning new skills, amplification options and communication strategies were introduced and their benefits, constrains and limits discussed.
Abrams, Hnath-Chisholm, Guerreiro and Ritterman (1992) stated that they covered relevant

anatomy, the hearing and communication processes, speechreading and communication skills, assistive listening devices and community support. Chisholm, Abrams and McArdle (2004) described their AR programme as containing information about the auditory process, communication strategies, adverse listening situations, visual cues, anticipatory strategies, repair strategies, environmental management and telephone use. Sweetow and Henderson-Sabes (2006) described development and content of their computer programme LACE™ in detail, concentrating on speech recognition, cognitive skills, linguistics and interactive communication strategies.
In summary, most AR programmes contain information about the hearing process, communication and repair strategies, and amplification – either in form of hearing aids or hearing assistance technology.

Most AR programmes were created as a supplement for adults who had been fitted with hearing aids (Abrams et al., 1992; Benyon et al., 1997; Abrams et al., 2002; Chisholm et al., 2004; Preminger & Yoo, 2010). One programme is aimed at older adults (working and retired) with or without hearing aids (Hickson, Worrall & Scarinci, 2007).

In the literature, there is a lack of group AR programmes developed for the specific situation of the working population with hearing impairment. Hétu and Getty (1991) and Li, Li-Tsang, Lee, Lee and Lam (2006) developed programmes in French and Chinese respectively for workers with occupational hearing impairment. Taking into account that hearing aid adoption rates are low in the working age groups, there is a specific need for an English programme that is aimed at working adults who do not use amplification.

1.2.4.2 Issues with measuring outcomes of AR programmes

Although AR group programmes are found to be effective, Hawkins (2005) pointed out that the results found in his literature review – moderate short term benefits in HRQoL-, do not mirror his personal experience of the vast benefits that AR group participants experience. He stated that uncontrolled variables might have contributed to the results being widely varied. He mentioned the skill of the facilitator as an uncontrolled variable that should be investigated. Preminger (2007) added class content, length of programme, frequency, effectiveness of outcome measures and demographics of the participants to the list. Considering the wide variety of AR programmes, frequencies, facilitation styles, theoretical frameworks, and target audiences need to be investigated in controlled studies.
In an attempt to address the issue of uncontrolled variables, Preminger (2003) evaluated

content and target audience as variables and found that groups including significant others reported more benefit. However, as two variables changed in this study at the same time, target audience and content, it was impossible to identify the variable that contributed most. In a follow-up study (Preminger & Yoo, 2010), the authors varied contents and facilitation style in their programmes in order to isolate the influence of content. Three different groups received different content in the form of: (1) communication strategies training, (2) communication strategies training plus psychosocial exercises, and (3) an informal lecture plus psychosocial exercises. All three groups showed benefits with minimal variations in outcome measures. Although the authors attempted to control for content only, too many variables (i.e., delivery as lecture or group setting, with or without psychosocial exercises) were altered to give a clear picture of the influence content had on the outcome.

Hawkins (2005) contemplated if the chosen outcome measures were another contributing factor to the weak results in AR effectiveness. Preminger (2007) reviewed the literature regarding appropriate outcome measures for AR programmes. Frequently used disease specific HRQoL outcome measures were the Hearing Handicap Inventory for the Elderly (HHIE; Ventry & Weinstein, 1982) and the Hearing Handicap Inventory for Adults (HHIA; Newman, Weinstein, Jacobson & Hug, 1990). Hawkins (2005) mentioned that both questionnaires seemed to lack the ability to capture the degree of psychosocial benefit that participants reported to him in personal communication. Additionally, Brewer (2001) found that benefit was sometimes reflected as lower handicap perception as participants learn to cope better. Other participants showed an increased handicap score as they had an increased awareness of their limitations. A qualification of the score would be needed to interpret the outcome of the HHI in context of the participant's experience.

Another disease specific HRQoL questionnaire commonly reported in the literature was the Communication Profile for the Hearing Impaired (CPHI;, Demorest & Erdman, 1986). Although more comprehensive, Preminger (2007) pointed out that cognitive and physical responses to hearing impairment were still not measured.

A frequently used generic HRQoL measure was the Short Form Health Survey (SF-36; Ware & Sherbourne, 1992). As already discussed in the context of hearing aids, generic HRQoL measures contain a minimal number of questions regarding communication. Therefore they are not sensitive outcome measures within the field of AR.

As a consequence of these limitations, Preminger (2007) urged clinicians to use a test battery of outcome measures that are sensitive to the psychosocial benefits of the researched AR

programme.
In another publication, Gagné (2003) reviewed suitable outcome measures for effectiveness research of AR programmes. He pointed out that the complexity of the WHO health model and the interactions of all ICF factors with each other create a very unique situation for each participant. Benefits of AR programmes might be caused by variables that are not controlled or accounted for. This complexity posed a challenge to researchers who attempted to measure the benefits of an AR programme, because they could not be measured by a standardised questionnaire. Gagné advocated for individualised outcome measures in order to reflect the benefit of the treatment. Additionally, he urged researchers to elicit in a semi-structured interview both facilitating and restraining factors that might have hindered or advanced the evaluated treatment. In such an interview, other impacts and consequences of the treatment might come to light that were not reflected in the outcome measures.
One explanation of the discussed problems with outcome measures could lie in the theoretical frameworks in which the research tools originate. HHI, CPHI and SF-36 are designed to measure health-related quality of life. Many AR programmes, however, aim foremost at the reduction of stigma and stigma-induced identity threat. Therefore, studies evaluating these programmes should include outcome measures that measure stigma perception and stigma - induced identity threat. However, no such outcome measures have been established for AR programmes.

1.3 Outcome measures

In light of the limitations of outcome measures and the resource limitations of a master thesis, a combination of outcome measures was chosen that was achievable and offered enough information to shape a comprehensive assessment of the treatment outcome.

To offer continuity with the outcomes of the previous pilot study (Rebecca-Campbell, in press) and other current works in the field, the Hearing Handicap Inventory for Adults (HHIA; Newman, Weinstein, Jacobson & Hug, 1990) and the International Outcome Inventory – Alternative Interventions (IOI-AI; Noble, 1992) were chosen. Although no psychometric data was available for the IOI-AI, it was the only condition specific outcome measure available.
Previously, patterns in cognitive anxiety levels were established in a study about interventions with hearing aids (Kelly, Neimeyer & Wark, 2011). The Cognitive Anxiety

Scale (CAS; Viney & Westbrook, 1976; DiLollo, Manning & Neimeyer, 2003) was included to investigate if cognitive anxiety was present in the intervention with the AR programme and what changes could be observed.

1.3.1 International Outcome Inventory – Alternative Intervention

The International Outcome Inventory – Hearing Aids (IOI-HA; Cox et al., 2000) was developed as a self-report outcome measure to determine functional success of treatments in health related fields. It is available in many different languages to make outcomes globally comparable. It assesses different domains of outcomes: daily use, benefit, residual activity limitations, satisfaction, impact on others and quality of life. Each question has five answer options, on a scale ranging from worst to best. The five answer options are scored with numbers one (worst outcome) to five (best outcome); a higher score indicates better outcomes. The questionnaire was designed to be administered in paper and pencil mode. The psychometric properties of the English version were evaluated by Cox and Alexander (2002). Cronbach's alpha was calculated for each question, with values between 0.62 and 0.86. Noble (2002) extended the questionnaire to significant others and non-hearing-aid-based interventions. These 'alternative interventions' to be evaluated can be assistive listening devices, communication strategies or surgery. The questionnaire was altered such that the words 'hearing aids' were substituted with <the listening aid(s)/using the listening strategies/having surgery>. Hickson, Worrall and Scarinci (2006) found good internal consistency of the IOI-AI with Cronbach's alpha > 0.79. No other psychometric properties have been reported.

1.3.2 Hearing Handicap Inventory for Adults

The Hearing Handicap Inventory for Adults (HHIA; Newman, Weinstein, Jacobson & Hug 1990) aims to measure the emotional and psychosocial consequences of hearing impairment. Despite the limitations discussed previously, the HHIE and HHIA are still widely used as outcome measures for AR programmes (Abrams, Hnath-Chisholm, Guerreiro & Ritterman, 1992; Kricos & Holmes, 1996; Brewer, 2001; Preminger, 2003; Preminger & Yoo, 2010). The HHIA is an adaption of the Hearing Handicap Inventory for the Elderly (HHIE; Ventry & Weinstein 1982). It was developed in the terminology of a historic understanding of disability (High, Fairbanks, & Glorig, 1964).The construct of hearing handicap commonly

describes the impact of activity limitations and participation restrictions resulting from hearing impairment. It consists of 25 items identifying the problems caused by hearing impairment and the perceived hearing handicap by the individual. Three answer options are given for each question, “Yes” (four points), “sometimes” (two points) and “no” (zero points) with a scoring range from 0 – 100 points. Twelve answers form a social subscale, with a total possible score of 48, and thirteen questions form an emotional subscale with a total possible score of 52. Higher scores indicate a higher self-perceived hearing handicap.

The HHIA has been shown to have a high internal consistency. The HHIA had a Cronbach’s alpha of 0.93, the social subscale a Cronbach’s alpha of 0.85 and the emotional subscale 0.88 (Newman, Weinstein, Jacobson & Hug 1990). The HHIA had a high test-retest reliability, ranging from 0.93 to 0.97 (Newman, Weinstein, Jacobson & Hug 1991). These reliability and validity measures were recently confirmed to be transferable to translated versions in other languages (Monzani et al 2007; Aiello, De Lima & Ferrari, 2011).

1.3.3 Cognitive Anxiety Scale

Cognitive anxiety as a concept was developed in Personal Construct Theory (Kelly, 1955), and is thought of as a transient state of anxiety caused by unpredicted events. It was operationalised into a scale by Viney and Westbrook (1976) using content analysis. CAS as a research tool was adapted for the field of communication disorders by DiLillo, Manning and Neimeyer (2003), and used in their research into stuttering. Kelly, Neimeyer and Wark (2011) employed it in research into help-seeking behaviour of hearing impaired persons. DiLolli, Manning and Neimeyer (2003) argue that content analysis allows participants to describe their experiences meaningfully in their own words and are not forced into answer categories of pre-formulated questionnaires.

The content analysis of verbal behaviour has been used in psychology to assess transitory psychological states (Viney, 1983). The underlying assumption of content analysis is that the way people choose to express themselves reflects the nature of these psychological states. Gottschalk and Gleser (1969) provided nine steps to be taken when constructing a content analysis scale. First, the researcher must describe and define the dimensions of the psychological state under investigation. For the CAS, the psychological state under investigation is the unidimensional construct, cognitive anxiety. Second, the researcher must define the unit of the content to be analysed. For the CAS, the unit is the clause defined as a

segment of language that contains an active verb. The third step involves specifying the cues referring to the content of the verbal communications from which the psychological state will be inferred. The fourth step involves specifying the intensity of the psychological state based on those cues. The fifth step involves applying weights to these cues. Details of the specification of content and intensity of the cues for the CAS will be described.

The sixth step provided by Gottschalk and Gleser (1969) involves including a correction factor to account for the number of words in the sample. For the CAS, the correction factor is calculated by dividing the total number of words in the sample into 100. In the next step, a score is derived. The distribution over various samples is then examined so that the data can be corrected for any skewing. For the CAS, the distribution of scores was found to be positively skewed, so square root transformations are applied to the score (Viney & Westbrook, 1976).

Finally, the researcher must establish normative data from specified samples of people and situations. The normative data for the CAS were collected for five samples (Viney & Westbrook, 1976). The first sample comprised a group of 32 university students in their second year of study. The second sample comprised 35 psychiatric patients who had been hospitalized for a long period of time. Despite the demographic differences between these samples, their CAS scores were similar. The third sample comprised 48 students who were enrolling in the university for the first time. Despite being demographically similar to the first sample, the CAS scores for this sample differed significantly from those of the other group of students. Unlike the first two samples, individuals in the third sample were experiencing novel stimuli, and therefore presumed to be experiencing greater cognitive anxiety (Viney & Westbrook, 1976).

The final two samples were interviewed with slightly different techniques, but still demonstrated high levels of cognitive anxiety. The fourth sample comprised 200 mothers who had recently given birth. The fifth sample comprised 52 women who were recently relocated to new public housing facilities. The CAS scores for these samples were significantly higher than those of the established students and psychiatric patients. Viney and Westbrook (1976) stated that the significant differences between the groups reflect their "reactions to new and unintegrated experiences" (p. 145).

Data from the sample of mothers were used to assess the relationships between CAS scores and some demographic variables. For this sample, cognitive anxiety was not found to vary

with age or years of education, but was found to vary with socioeconomic status (Viney & Westbrook, 1976). Data from the new students was used to assess the relationships between CAS scores and other cognitive variables. For this sample, cognitive anxiety was not found to vary with academic performance, feelings of mastery or tendency to respond in a socially acceptable manner (Viney & Westbrook, 1976).

Data from the sample of new students were also used to assess the stability variance of the CAS. Five sets of verbal samples were taken at 2-week intervals for this group. Results indicated significant variation in the CAS scores, reflecting the transitory nature of cognitive anxiety. Finally, data from the sample of mothers were compared across the various stages of the child-bearing experience. Analysis revealed different CAS scores for the different events being discussed. Verbal samples about the pregnancy and labour, both uncertain experiences that may require extra constructs, resulted in significantly higher CAS scores than verbal samples about the hospital stay (Viney & Westbrook, 1976). The authors concluded that the CAS scores varied as a function of the extent to which the various experiences of the mothers were successfully anticipated and integrated into their construct systems.

Data for the cognitive anxiety scale is collected through prompting participants to speak about their experiences and recording their responses. Viney and Westbrook (1976) specified the content and intensity of the cognitive anxiety cues for the CAS. First, they outlined three non-mutually exclusive scoring categories for each unit. The first category, coded Ca3, reflects cognitive anxiety that is experienced by the self. The second category, coded Cb2, reflects cognitive anxiety that is experienced by others. The third category, coded Cd1, reflects cognitive anxiety that is expressed, but denied. Each of these categories contains a weighting coefficient, such that self-references are weighted most heavily, references to others are weighted less, and statements of denial contain the least weighting. Each category is weighed and a total score is calculated by a root transformation formula (Viney & Westbrook, 1976; DiLollo, Manning & Neimeyer, 2003). High scores indicate a higher level of cognitive anxiety, pointing to unsuccessful appraisal and predictions of communication outcomes.

It was noticed by the researchers that the theoretical concepts of cognitive anxiety and stigma-induced identity threat were nearly identical. In both concepts, individuals appraise social interactions and constantly re-enforce their constructs of meaning, or identity, with the outcomes of these appraisals. If outcomes are unpredicted, meaning, or identity are threatened. It was theorised that cognitive anxiety might be caused by, or be an expression of,

stigma-induced identity threat. If this was true, stigma-induced identity threat could be operationalised through and measures with CAS.
To explore this possibility further, CAS was treated as experimental outcome measure for stigma-induced identity threat. Results were interpreted within both theoretical constructs of cognitive anxiety and stigma-induced identity threat.

1.4 Research questions

In the literature, there is no AR programme that is specifically aimed at working adults who do not wear amplification. For this reason, an AR programme for this target population was developed ("Hear it! See it! Say it!"). It was designed after a review of the existing literature, consultation with audiologists working with adults with hearing impairment and a focus group consisting of working adults with hearing impairment. The programme consists of three group sessions, introducing communication strategies in theory, followed by practical exercises.

The first and second pilot studies (Kelly-Campbell, in press) examined the outcomes for a sample living in the United States. Outcomes for those studies showed improvement in quality of life following the programme. The present study aimed at measuring short- and mid-term outcomes of a New Zealand specific version of the programme, specifically changes in HRQoL and cognitive anxiety. Finally, it was expected that participants would report using communication strategies in relevant listening situations.

The Research questions were:

1. Is there a significant difference between pre-group and waitlist assessment outcomes?
2. Is there a significant difference between pre-group and post- group assessment outcomes?
3. Is there a significant difference between post-group and follow-up assessment outcomes?
4. Is there a significant difference between pre-group and follow-up assessment outcomes?
5. Do participants take steps to improve communication in the workplace?

2. METHODS

The purpose of this study was to evaluate the outcomes of the new audiologic rehabilitation (AR) group programme "See it! Hear it! Say it!" in the New Zealand context.
The study was approved by the Ethics Commission of the University of Canterbury.

2.1 Participants

It was decided that an effect size of 0.5000 and above could constitute a "clinically significant" treatment effect. A *priori* power analysis (Portney & Watkins, 2009) was also conducted for this study. By referring to sample size tables, it was determined that in order to be able to detect clinically significant effects, a minimum of 16 participants would be necessary.

2.1.1 Inclusion and exclusion criteria

Participants needed to meet the following inclusion criteria:

a. be 45 – 64 years of age
b. be self-identified as having communication problems due to hearing impairment
c. be employed outside their home
d. have no previous experience with hearing aids or assistive listening devices
e. have a four frequency puretone average (4-PTA) of 16 – 55 dB HL at the frequencies 0.5, 1.0, 2.0 and 4.0 kHz in at least one ear

Any participants with the following criteria were excluded:

a. recent sudden hearing impairment
b. tinnitus sufferers, who assess themselves as moderately to severely affected by tinnitus, if their primary interest was to improve the tinnitus.

The inclusion and exclusion criteria aimed at creating a homogenous group of adults in the later stage of their working life with a similar level of experience with hearing impairment. The age range was chosen to offer comparison to the data of Marke Trak (Kochkin, 2009) and the standardisation of the questionnaire "Hearing Handicap Inventory for Adults" (HHIA). The inclusion criteria for hearing impairment were defined in a way that would allow participants with up to moderate hearing impairments to participate. Following the

hearing impairment classification by Clark (1981), a puretone average of 16 dB HL (slight hearing impairment), or greater in at least one ear was required. The classification was undertaken by Clark for children, but this approach was adopted for adults for the present study. Clark's classification was also modified in regard to the frequencies that were included in the puretone average. Following the classification recommendations of Goodman (1965), Clark based the extent of loss on a three frequency puretone average (PTA) at 0.5, 1 and 2 kHz. In this study a 4-PTA at 0.5, 1, 2 and 4 kHz was calculated. This approach was chosen in order to include candidates with high frequency hearing impairment who might show normal hearing levels in lower frequencies up to 2 kHz. Candidates with a hearing impairment greater than moderate impairment (>55 dB HL) were excluded as their level of frustration with communication breakdowns was expected to negatively influence the group dynamics. Candidates with recent sudden hearing impairment were excluded as their needs should be focussed on urgent medical attention. Individuals with tinnitus (ringing in the ear), who assessed themselves as moderately to severely affected by this condition, were also excluded from this study if their primary interest was to improve their tinnitus.

2.1.2 Recruitment

Participants were recruited from members of the public between April and May 2012 in the Canterbury region, New Zealand.

Advertisements (appendix 1) were distributed across the wider Christchurch region to 191 public locations such as libraries, medical centres, dentists, shopping malls, physiotherapists, tertiary education institutes, churches, and the hospital. The advertisement was sent by e-mail to principals and CEOs of all primary, secondary and tertiary education institutions in the wider Canterbury area, the city council, a private enterprise, and the Canterbury District Health Board for distribution to their staff members. Online advertisements were posted on a community notice board and a radio station read out an invitation in their community notice board section. The Hearing Association Christchurch published an article about the programme in their April 2012 newsletter. Additionally, 30 potential candidates were identified from clinical records of the University of Canterbury Speech and Hearing Clinic. These candidates were invited via a telephone call to participate in the study.

Thirty five interested candidates contacted the researchers. These candidates were sent an e-mail outlining the content, time line, inclusion criteria of the study and invitation for a recruitment appointment. The invitation e-mail including all four attachments is enclosed in appendix 2. Twenty one candidates attended a recruitment appointment to establish eligibility. One person did not meet the inclusion criteria of 4-PTA greater than 15 dB HL and was therefore excluded from the study.

2.1.3 Enrolment, group assignment and withdrawals

Twenty people enrolled in the study. Eleven participants were randomly assigned to either the waitlist group or the non-waitlist group by tossing a coin, while nine participants were assigned to the group of their choice due to time and work commitments. The non-waitlist group consisted of nine members, of which seven were randomly assigned. The waitlist group consisted of eleven members, of which four were randomly assigned while seven were not.

Thirteen participants completed the programme (n= 13). A total of seven participants withdrew from the programme (n= 7). A timeline of assessments and group meetings is shown in figure 2.1.

In the non-waitlist group, seven members attended all group sessions (n= 7). Two members withdrew after the first group meeting for unknown reasons. One person failed to attend the follow-up meeting (n= 6).

The attendance of the waitlist group was affected by a severe influenza outbreak in July 2012 in Canterbury, New Zealand. A total of six participants completed the programme (n= 6). Participants 8, 11 and 12 completed the programme in the regular time of three weeks. A catch up session was held for members 9, 10 and 13 during the following week as they were not able to attend the previous meeting due to work commitments and illness. These three members completed the programme within a time period of four weeks. Three members of the waitlist group withdrew from the programme after the waitlist period due to illness. Another two participants attended two group meetings, but withdrew after that due to illness.

2.1.4 Socio-economic characteristics of participants

Thirteen participants completed the programme in total: six males (46%) and seven (54%) females. Three participants were in the age bracket of 45 – 54 years (23%), and ten

participants were in the age bracket of 55 – 64 years (77%). The mean age of the participants was 56.8 years with a standard variation of 4.0 years. The participants self-described their ethnicity as “Pakeha” (5, 38%), “European” (4, 31%), “New Zealander” (2, 15%), “Caucasian” (1, 8%), and “White” (1, 8%).

Six participants (46%) were born overseas, with countries of origin in Australia, Europe, North America and South America. One person (8%) spoke English as a second language.

To find out about communication partners at home, participants were asked about their living arrangements. Eight participants (62%) lived with other adults, three (23%) lived with adults and children and two participants (15%) lived by themselves.

The highest level of education for three participants (23%) was secondary school, five participants (38%) had tertiary education degrees and post graduate education was reported by another five participants (38%).

Nine participants (69%) were the main income earners of their family, while three (23%) were not and one person (8%) contributed about 50% of the income. The total annual household income of two participants (15%) was up to NZ$ 50,000, four participants (31%) earned between NZ$ 50 – 100,000 while the household income of six (46%) participants was over NZ$ 100,000. One person (8%) preferred not to share their annual household income.

Two participants (15%) worked in part time roles (<35 hours per week) while 11 participants (85%) worked in full time positions (35 hours or more). The mean working hours per week were 41.4 hours with a standard deviation of 13.5 hours.

Eight participants worked in an occupation qualified as professional (62%), two participants (15%) in administration, two participants (15%) as technicians, and one person in sales (8%).

Regarding their job security, five participants (38%) felt their job was very safe, seven participants (54%) felt their job was safe while one person (8%) sensed their job was slightly insecure.

The socioeconomic characteristics of participants are summarised in table 2.1.

Parti-cipant	Gender	Age	Ethnicity	Country of origin	Education	Living situation	Main income earner	Annual household income in $1000	Working hours	Job type	Job security
1	Male	57	Pakeha	New Zealand	Post-graduate	With adults	Yes	50 - 100	40	Professional	Safe
2	Female	60	Pakeha	New Zealand	Tertiary	With adults	No	Not specified	20	Admin	Safe
3	Female	56	Pakeha	New Zealand	Secondary	With adults	Yes	< 50	40	Admin	Safe
4	Female	56	Pakeha	New Zealand	Post-graduate	With children and adults	50-50	> 100	40	Professional	Slightly insecure
5	Male	60	European	New Zealand	Secondary	With adults	Yes	> 100	35	Sales	Very safe
6	Male	56	NZ	New Zealand	Secondary	By myself	Yes	50 - 100	38.5	Technician	Safe
7	Female	54	NZ	Europe	Tertiary	With adults	No	> 100	50	Professional	Very safe
8	Male	47	White	North America	Post-graduate	By myself	Yes	< 50	40	Professional	Safe
9	Male	58	European	Europe	Post-graduate	With adults	Yes	> 100	4	Professional	Very safe
10	Female	62	European	South America	Post-graduate	With adults	Yes	> 100	80	Professional	Safe
11	Male	53	Caucasian	Europe	Tertiary	With children and adults	Yes	50 - 100	40	Professional	Safe
12	Male	61	European	Australia	Secondary	With children and adults	Yes	50 - 100	43	Technician	Very safe
13	Female	59	Pakeha	New Zealand	Tertiary	With adults	No	> 100	32	Professional	Very safe

Table 2.1: Socio-economic characteristics of participants

2.2 Audiologic assessment

Participants underwent an audiologic assessment at the recruitment meeting in order to determine their hearing impairment. The results of the assessment were discussed with the participants.

2.2.1 Equipment

All tests were performed in the Speech and Hearing Clinic of the University of Canterbury, Christchurch, New Zealand. The test room was double-walled and sound treated. Immittance audiometry was administered using a GSI TympStar Middle Ear Analyser (Grason-Stadler Corp USA). A GSI-61 audiometer connected to an Onkyo DX390 compact disc changer was used for presentation of puretones and speech signals. Etymotic ER3A insert ear phones and Telephonic TDH-39 headphones served as transducers. Bone conduction testing was performed using a Radioear B-71 bone oscillator.

Calibration of all equipment was done within the last 12 months by an authorised calibration service.

2.2.2 Audiologic test battery

The test battery followed best practice guidelines for Standard Audiological Assessment of the New Zealand Audiological Society (New Zealand Audiological Society, 2008). It included case history, otoscopy, immittance audiometry, puretone audiometry and speech audiometry. Additionally, a QuickSIN test (Killion, Niqette, Gudmundsen, Revit & Banerjee, 2004) was included to obtain information about the signal-to-noise ratio loss of each participant. Audiologic assessments were administered only once.

Case history was taken first in order to obtain important information and diagnostic cues that might help to interpret audiometric data and to determine the need for medical referral. Otoscopy was performed to rule out any obstructions in the ear canal and to get a visual impression of the tympanic membrane.

Following that, immittance audiometry was recorded following standard clinical procedures of adult immittance audiometry (New Zealand Audiological Society, 2007a). Immittance testing was done in order to detect perforations in the ear drums, middle ear pathologies, estimate the middle ear pressure and screen for middle ear effusion (Shanks & Shohet, 2009). Four quantitative measures were taken: ear canal volume, peak pressure, peak compensated static acoustic immittance and tympanometric width.

For puretone audiometry, monaural threshold seeking followed the modified Hughson-Westlake ascending method according to the best practice guidelines (New Zealand Audiological Society, 2012b). Air-conduction thresholds were obtained for 250 – 8000 Hz; bone conduction thresholds were obtained at 500, 1000, 2000 and 4000 Hz if air conduction testing showed a threshold of 20 dB HL or worse. Threshold seeking and plateau masking procedures were followed in order to determine the location of the lesion (Yacullo, 2009).

Speech audiometry was conducted monaurally following the best practice guidelines (New Zealand Audiological Society, 2007b), using the New Zealand version of the Consonant-Vowel-Consonant (CVC) word lists (Purdy, Arlington & Johnstone, 2000), developed originally as AB word list by Boothroyd and Nittrouer (1988). Speech audiometry served as a cross check of the puretone thresholds. The half-peak level (HPL) of the performance-intensity-curve (P-I-curve) needed to be within +/- 15 dB of the air conduction puretone threshold to be considered as consistent with the puretone audiometry results. For steeply sloping hearing impairments, the HPL had to be within +/- 15 dB of the average loss of 2 – 4 kHz (New Zealand Audiological Society, 2007b).

A QuickSIN test was included in the test battery order to determine the signal-to–noise ratio (SNR) loss of each participant. As no version of the QuickSIN with a New Zealand accent was available, the standard version by Etymotic with a standard American accent was used. The test involves binaural presentation of sentences in the presence of background noise. The sentences were presented in sets of six, with the level of background noise increasing at each sentence. The SNR decreased for each sentence, making it more difficult for the candidate to identify the sentence correctly. The SNR of the first sentence was 25 dB, reducing in steps of 5 dB to the lowest level of 0 dB SNR. Each sentence contained five key words that were scored with one point each when identified correctly. The SNR loss was calculated by subtracting the total score from 25.5 dB:

$$SNR\ loss = 25.5\ dB - total\ score$$

The higher the score, the more severe was the SNR loss.

One practice list was given, followed by two test lists. The average of the two test lists were used to define the SNR loss.

Normative data were available (Killion, Niquette, Gudmundsen, Revit & Banerjee 2004), with 0-3 dB SNR loss classified as normal/near normal hearing, 3-7 dB as mild SNR loss, 7-15 dB a moderate SNR loss and >15 dB a severe SNR loss.

2.2.3 Audiometric results

Immittance testing results indicated normal middle ear function for eleven participants; sealing of the ears of one person could not be achieved and one participant was not tested. Sixteen ears (77%) had normal measurements and were classified as Type A. Six ears (23%) showed compliance values greater than the normal range and were classified as A deep (New Zealand Audiological Society, 2007a).

Puretone results were used to calculate the 4-PTA and then classified into better hearing and worse hearing ear.

The results for the better hearing ears ranged from normal hearing to a moderate impairment. Four participants (31%) had normal hearing, seven (54%) had a slight impairment, one person (8%) had a mild impairment and one person (8%) had a moderate impairment. The mean was 18.8 dB HL with a standard deviation of 8.8 dB.

The worse hearing ears ranged from slight to moderately severe impairment. Seven participants (54%) had a slight impairment, three people (23%) had a mild impairment, one

person (8%) had a moderate impairment and two participants (15%) had a moderately severe impairment. The mean was 29.7 dB HL with a standard deviation of 18.1 dB.

The half-peak level of the P-I-curve of speech audiometry was within +/- 15 dB of puretone thresholds for all participants. This result confirmed that speech audiometry results were consistent with puretone thresholds.

The QuickSIN results showed a range from normal hearing to moderate SNR loss. Seven participants (54%) had normal/near normal hearing, four participants (31%) had a mild SNR loss and two persons (15%) showed a moderate SNR loss. The mean was 3.8 dB with a standard deviation of 4.0 dB.

The results of the audiologic assessments are summarised in table 2.2.

Participant	4-PTA Better Ear in dB HL	4-PTA Worse Ear in dB HL	SNR loss in dB	Speech HPL Better Ear in dB HL	Speech HPL Worse Ear in dB HL	Immittance testing right	Immittance testing left
1	17.50	17.50	1.0	23	27	A deep	A
2	11.25	16.25	-0.5	15	23	A	A deep
3	8.75	16.25	3.0	7	9	Could not seal	Could not seal
4	21.25	26.25	4.5	20	28	A deep	A deep
5	41.25	43.75	14.0	40	42	A	A
6	17.50	21.25	8.5	23	25	A	A
7	10.00	16.25	1.0	10	23	A	A
8	18.75	31.25	1.0	23	31	A	A
9	26.25	31.25	4.0	32	42	A	A
10	10.00	17.50	1.5	11	17	A	A
11	16.25	17.50	0.5	23	28	A	A
12	23.75	58.75	3.5	40	75	A deep	A deep
13	21.25	72.50	7.0	20	70	Did not test	Did not test
Mean	18.75	29.71	3.8	22.1	33.8	N/A	N/A
SD	8.75	18.14	4.0	10.4	19.3	N/A	N/A

Table 2.2: Participants' audiometric results

2.3 Research design

A quasi-randomised pre-test / post-test / follow-up with waitlist design was used. Waitlist designs offer an alternative to a non-treatment control group where non-treatment is unethical and undesirable. The waitlist group serves two purposes: (1) as control group for non-treatment and (2) to assess the reactivity of the pre-test (Schiavetti & Metz, 2002).

2.4 Procedures

At enrolment, the participants were quasi-randomly divided into two groups: non-waitlist group and waitlist group. The non-waitlist group started treatment within two weeks of assessment. The waitlist group started treatment after a five to ten week waitlist period.

The programme was conducted over three weeks. Each session was held in the evening for two hours. The researcher and her supervisor facilitated the groups in rooms of the Speech and Hearing Clinic of the University of Canterbury. In order to cater for different learning styles (visual, aural, reading/writing, kinaesthetic; Leite, Svinicki & Shi, 2009), a variety of teaching techniques were incorporated into the programme: presentations, group or individual work, practical exercises, and goal setting for the upcoming week. Activities were sequenced such that they provided exposure and guided experimenting within a safe environment. After setting activities up, participants were monitored to stay on task; after closing an activity, the outcomes were fed back into the group and integrated into the overall concept of the programme. Individual goals were set every week which were evaluated regarding obstacles and success. The purpose of this contract style goal setting was to serve as motivation to remain focussed on the goals.

Multiple outcome measures were repeated over a period of three months. Data were collected at the recruitment appointment (pre-group assessment), after the last group meeting (post-group assessment) and at a follow-up meeting twelve weeks after the last group meeting (follow-up assessment). The waitlist group additionally had data collected after the waitlist period (waitlist assessment), just before the first group meeting. Figure 2.1 shows the timeline of the data collection and group meetings.

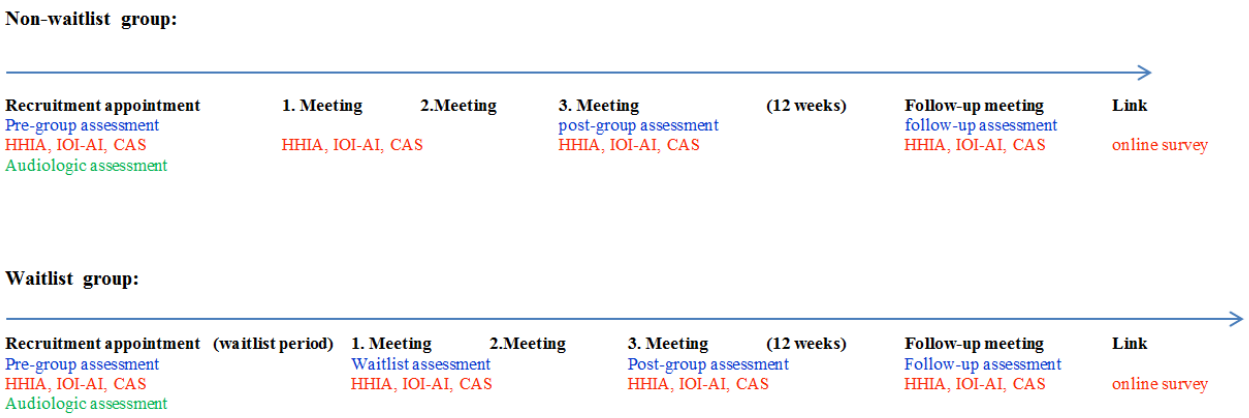


Figure 2.1: Timeline of data collection and group meetings

IOI-AI: International Outcome Inventory – Alternative Interventions
HHIA: Hearing Handicap for Adults
CAS: Cognitive Anxiety Scale

2.5 Materials

The participants underwent the audiologic rehabilitation (AR) group programme "See it! Hear it! Say it!" The outcomes of the programme were measured with the International Outcome Inventory – Alternative Intervention (IOI-AI; Noble, 2002), the Hearing Handicap Inventory for Adults (HHIA; Newman, Weinstein, Jacobson & Hug, 1990) and the Cognitive Anxiety Scale (CAS; Viney & Westbrook, 1976; DiLollo, Manning, Neimeyer 2003). The behavioural changes that the participants implemented following the programme were elicited with a non-standardised questionnaire (online questionnaire).

2.5.1 Intervention: Audiologic rehabilitation programme "See it! Hear it! Say it"

The audiologic rehabilitation programme used for the intervention was a new programme focussing on communication strategies, called "See it! Hear it! Say it!" It was developed and piloted in the United States by the researcher's supervisor (Kelly-Campbell, in press).

The programme was conceptualised as an educational group intervention for working adults with hearing impairment who do not use amplification. It was developed after literature review, round-table discussions with audiologists who work in the field and a group of working adults with hearing problems.

The stakeholders had asked for an educational programme of short duration. The focus of the programme was to improve the communication at the work place and in social situations. The

stakeholders recommended that didactic presentation of material should be supplemented with practical exercises. Significant others were acknowledged as important communication partners, but it was felt that a programme focussing on the workplace should not include them.

"See it! Hear it! Say it!" was adapted by the researcher to the New Zealand context and the researcher's facilitation style; the facilitation style is based on the principals of communicative language teaching (Byram & Méndez García, 2009). In three sessions, each lasting two hours, participants learned about the visual and auditory aspects of oral communication, repair strategies, assertiveness and legal disability frameworks. The slides for the group meetings are included in appendix 3.

2.5.1.1 Session 1: Visual aspects of communication

The first part of the evening consisted of introduction of the group members and agreeing on basic group rules such as confidentiality and sharing of experiences.

The participants then worked in small groups to share their motivations for attending the programme. Common themes were presented to the whole group on cardboard cards and pinned to a wall. These cards stayed visible for the whole group during all meetings.

The didactic presentation part focused on effective communication and it's four elements: the speaker, the listener, the message and the environment (Tye-Murray, 2009). It was stressed that breakdowns in communication frequently happen and they can do so at any of these four elements.

Visible aspects of communication were identified. Lip reading and speech reading (Tye-Murray, 2009) were defined and discussed, followed by a practical exercise of lip reading. Visual conditions were purposely made difficult with unfavourable lighting, angle, unfamiliar accent of the speaker, and words that were difficult to lip read. After a first round of lip reading, participants were asked to suggest improvements to the situation. This exercise re-enforced the theoretical teaching about lip reading and gave the participants a practical experience in adapting adverse listening conditions.

After evaluating this experience as a group, the benefit of adding auditory information to the lip movements were explored (Pichney, Durlach, & Braida, 1985; Uchanski, Choi, Sunkyung, Braida, Reed & Durlach, 1996). Speech reading is used by most oral communicators and participants were told about the ways to make speech reading easier

(Erber, 1971; Berger, 1972; Erber, 1974; Bench, Daly, Doyle & Lind, 1995; Daly, Bench & Chapell, 1996; Kaiser, Kirk, Lachs & Pisoni, 2003; Tye-Murray, 2009). This was followed by a practical exercise of speech reading. Similar to the first exercise, conditions were held initially deliberately unfavourable, with the task for the participants to change lighting, speaker position, speaker posture, speech volume and pace.

In the last part of the meeting, each member analysed their work space individually using the presented information. Each member identified difficulties using visual cues at their workplace and set a goal for themselves regarding how to address these difficulties in the coming week. In small groups, members shared the outcomes of their analysis, inviting others to contribute their own experiences in similar situations.

2.5.1.2 Session 2: Auditory aspects of communication

The second session had three parts: review of the previous week's class, facts around audibility and hearing impairment and technology options.

The evening was started by evaluating the goals set in the previous week. The members shared their experiences in small groups, reporting the main themes to the entire group.

In this second session, the auditory aspects of oral communication were discussed. The definitions and elements of effective communication were recalled and auditory aspects for each factor identified. Practical speech reading exercises emphasised the presentation. The listening environment was deliberately designed in an unfavourable manner with a competing signal. Two lists of SPIN sentences (Kalikow, Stevens & Elliot 1977) were presented: one list of highly predictable sentences and one list with sentences that have low predictability. After the first presentation, members were asked to improve their listening conditions.

Hearing assistance technology systems (HATS, Thibodeau, 2009) were demonstrated to the participants in the third part of the evening. The use and cost of amplified telephones, amplified and visual telephone ringers, visual voice mail, speech-to-text software, shake-awakes, smoke alarms, amplified door bells, TV headphones, conference microphones and personal amplifiers were discussed. Additionally, each participant was handed a catalogue of a hearing technology supplier.

In the last part of the session, each member analysed individually their work space regarding audibility problems and made a plan for the week how to address this issue. In small groups, the plans were shared among participants.

2.5.1.3 Session 3: Communication strategies and styles; legal frameworks

The third meeting covered the topics of communication strategies, specific conversation repair strategies, communication styles and legal frameworks.

In small groups, members reviewed their success and struggles implementing their goals from the last session.

The following presentation discussed communication strategies and specific conversation repair strategies (Tye-Murray, 2009). Members were reminded that all conversations can break down and do so on a regular basis. Knowing specific repair strategies will help to maintain effective communication despite communication breakdowns and elicit the information they missed in various ways. Additionally to communication strategies, communication styles were discussed and members identified their own preferences (Tye-Murray, 2009).

As this course aimed at working adults, the relevant legal framework were explored. Three bills were important for workers with hearing impairment: the New Zealand Bill of Rights Act 1990, the Human Rights Act 1993 and the Employment Relations Act 2000. Employers are obliged to give equal treatment and opportunities to all employees; they must also genuinely attempt to accommodate specific needs employees might have.

Following that, participants analysed individually their work situation regarding use of communication strategies. They identified improvement potentials and set goals for themselves for the upcoming week. In small groups, they shared their goals.

In a feedback loop back to the first session, the group members revisited the reasons for attending, still displayed on the wall on cardboard cards. Each reason was reviewed and the contributing member were asked if their concerns were addressed during the programme. Any issues and communication problems still remaining were addressed at this point.

2.5.2 Outcome measures

Three outcome measures were administered during pre-group, waitlist, post-group and follow-up assessments. IOI-AI and HHIA were administered in pen-and-pencil format, while the CAS was extracted from a recorded audio interview. A link to the online questionnaire was sent via e-mail to all participants after the follow-up meeting.

2.5.2.1 International Outcome Inventory – Alternative Intervention

The IOI-AI contains seven questions covering the topics:

1) daily use
2) benefit
3) residual activity limitations
4) satisfaction
5) residual participation restrictions
6) impact on other
7) quality of life

Each question has five answer alternatives which are scored in a five point scale, with the worst outcome scored one and the best outcome scored five. The minimum score of the questionnaire is seven, the maximum score is 35. A higher score indicates better outcomes.

The wording of the questions can be adjusted to the intervention measured. In this case, the term “communication strategies” was inserted.

The IOI-AI was originally designed to serve as a post-treatment outcome measure. In this study, it is used as a pre-test / post - test measure. The questionnaire is attached in appendix 4.

2.5.2.2 Hearing Handicap Inventory for Adults

The HHIA is a self-assessment questionnaire with 25 items. Three answer options are given for each question, “yes” (four points), “sometimes” (two points) and “no” (zero points) with a scoring range from 0 – 100 points. Twelve answers form a social subscale, with a total possible score of 48, and thirteen questions form an emotional subscale with a total possible score of 52. High scores indicate a high self-perceived hearing handicap. The HHIA is attached in appendix 5.

2.5.2.3 Cognitive Anxiety Scale

In order to establish inter-rater reliability, pilot data had collected to establish coding and scoring guidelines for the analyses in this study. Participants for the pilot study were recruited through a hearing-aid based practice in the Memphis, Tennessee area. The researchers collected verbal samples from participants recruited by word of mouth. Data from this pilot sample were transcribed and two researchers trained on the procedures for defining and

coding the data used the established scoring guidelines by DiLollo et al. (2003). The researchers practiced scoring transcripts together. Then, the researchers coded transcripts independently and met to discuss any discrepancies. Transcripts from the participants in this pilot study were coded by one researcher using the scoring guidelines. Then, 20% of the transcripts from the study participants were randomly selected to be coded by the other researcher using the scoring guidelines. Inter-rater reliability was calculated using coefficient kappa (Cohen, 1960). Fleiss (1981) stated that "for most purposes, values greater than .75 or so may be taken to represent excellent agreement beyond chance…and values between .40 and .75 may be taken to represent fair to good agreement beyond chance" (p. 218). The inter-rater reliability for the researcher and the independent coder was .846, exceeding Fleiss' criteria for "excellent" agreement beyond chance.

Participants were prompted (see appendix 6) to describe their life with hearing impairment. Their answer was audio recorded for content analysis.

Interviews were recorded on an Olympus Digital Voice Recorder WS-6505. All interviews were transcribed into a Microsoft Word Document, claused and scored following the guidelines of Viney and Westbrook (1976) in appendix 7 and DiLollo et al. (2003) in appendix 8.

The Cognitive Anxiety Score was calculated using the formula:

$$CAS = \sqrt{(F \times W)CF + \frac{1}{2}\,CF}$$

F = Frequency: total number of times a particular category is scored

W = Weight: Weight attached to this category

CF = Correction Factor: Total number of words in sample divided into 100

Additionally, CAS was treated as experimental outcome measure for stigma-induced identity threat. Results were interpreted within both theoretical constructs of cognitive anxiety and stigma-induced identity threat.

2.5.2.4 Online questionnaire

The online questionnaire (appendix 9) was a non-standardised questionnaire which was designed to detect behavioural changes following participation in the programme, especially implementation of communication strategies. It contained nine questions, four questions had

the option of giving multiple answers, two could only be answered with one option, and three questions were open ended. All questions could be qualified with open ended comments. The questionnaire was made available to the participants online following the follow-up meeting and was completed by participants in their own time.

2.6 Data analysis

Due to the small sample size and non-normal distribution of the data, non-parametric statistics were employed to analyse the data.

Five research questions were asked in order to evaluate the AR programme:

1. Is there a significant difference between pre-group and waitlist assessment outcomes?
2. Is there a significant difference between pre-group and post- group assessment outcomes?
3. Is there a significant difference between post-group and follow-up assessment outcomes?
4. Is there a significant difference between pre-group and follow-up assessment outcomes?
5. Do participants take steps to improve communication in the workplace?

For group comparisons, Pearson chi-square tests were used to determine any significant differences in gender between the groups. Mann-Whitney tests were used to establish any significant differences in all other variables.

To answer study questions one to four, Wilcoxon Signed Ranks Tests were used to analyse the outcome measures IOI-AI, CAS and HHIA. Study question five was answered by descriptive statistics from the online questionnaire.

3. RESULTS

The purpose of this study was to evaluate the outcomes of a new audiologic rehabilitation group programme "See it! Hear it! Say it!" in the New Zealand context. The research questions were:

1. Is there a significant difference between pre-group and waitlist assessment outcomes?
2. Is there a significant difference between pre-group and post- group assessment outcomes?
3. Is there a significant difference between post-group and follow-up assessment outcomes?
4. Is there a significant difference between pre-group and follow-up assessment outcomes?
5. Do participants take steps to improve communication in the workplace?

Study questions one to four were addressed with the outcome measures International Outcome Inventory – Alternative Intervention (IOI-AI; Noble, 2002), Hearing Handicap Inventory for Adults (HHIA; Newman, Weinstein, Jacobson & Hug, 1990), and Cognitive Anxiety Scale (CAS; Viney & Westbrook, 1976; DiLollo, Manning & Neimeyer 2003) using Wilcoxon Signed Rank tests. The fifth study question was answered analysing the online questionnaire with descriptive statistics. The effect size was calculated using Cohen's d (Cohen, 1988).

The scores of the IOI-AI range from seven to 35 points. The higher the score is, the better the outcome.
The HHIA Total score ranges from zero to 100. The social subscale has a range of zero to 48, the emotional scale from zero to 52. High scores indicate a high self-perceived handicap.
The CAS does not have a fixed range of scores. The lower the number, the less cognitive anxiety is present. The higher the number, the more cognitive anxiety is detected.

In figures and tables, statistically significant results are marked with one asterisk; clinically significant results are marked with two asterisks.

3.1 Group comparisons

Two group comparisons were applied: firstly, the group of participants who completed the programme was compared with the group of participants who dropped out of the study. This was done in order to establish an adherence rate and factors that might have led to withdrawal. Secondly, the non-waitlist group was compared with the waitlist group in order to establish if they could be collapsed for data analysis.

The comparison between participants who completed the programme and the participants who withdrew was based on the variables gender, age, better ear four frequency puretone average (4-PTA), worse ear 4-PTA, and the pre-group assessment results of the outcome measures IOI-AI, CAS and HHIA. Quick Speech-in-Noise (QuickSIN) test results for the group of participants who withdrew were not available; hence they could not be included in this comparison.

The comparison between participants of the non-waitlist group and the waitlist group was based on the variables gender, age, better ear 4-PTA, worse ear 4-PTA and signal-to-noise-ratio (SNR) loss.

3.1.1 Completed and withdrawn

From twenty enrolled participants, thirteen completed the programme and seven withdrew. This meant the AR programme had an adherence rate of 65%.

A Chi-squared test showed no statistically significant difference in gender (χ^2=0.02, p=0.630), and Mann-Whitney-tests showed no statistically significant differences in age (U=43.50, p=0.877), worse ear 4-PTA (U=44.00, p=0.938), IOI-AI pre-group mean (U=28.00, p=0.164), CAS pre-group mean (U= 27.00 , p= 0.143) , HHIA Total pre-group mean (U=37.50, p=0.525), HHIA Social pre-group mean (U=38.50, p=0.574) and HHIA Emotional pre-group mean (U=36.00, p=0.447) between participants who completed the programme and those who withdrew. There was a statistically significant difference between those who completed the programme and those who withdrew in the better ear 4-PTA (U=19.00, p=0.035). Participants in the group who withdrew had a significantly worse mean in the better ear 4-PTA (29.11 dB HL) compared to the group who completed the programme (18.75 dB HL). The results are summarised in table 3.1.

Variable	Group	N	Male	Female	χ2	p
Gender	Completed	13	6	7	0.02	0.630
	Withdrawn	7	3	4		

Variable	Group	N	Mean	SD	U	p
Age	Completed	13	56.85	3.997	43.50	0.874
	Withdrawn	7	55.71	6.020		
Better ear 4-PTA in dB HL	Completed	13	18.75	8.750	19.00	0.035*
	Withdrawn	7	29.11	10.120		
Worse ear 4-PTA in dB HL	Completed	13	29.71	18.140	44.00	0.905
	Withdrawn	7	27.57	15.640		
IOI-AI Pre	Completed	13	17.31	4.366	28.00	0.164
	Withdrawn	7	20.71	7.158		
HHIA Pre Total	Completed	13	34.00	13.663	37.50	0.525
	Withdrawn	7	30.57	12.313		
HHIA Pre Social	Completed	13	16.31	5.936	38.50	0.574
	Withdrawn	7	14.86	5.014		
HHIA Pre Emotional	Completed	13	17.85	8.620	36.00	0.447
	Withdrawn	7	15.71	8.120		
CAS	Completed	13	0.8329	0.332	27.00	0.143
	Withdrawn	7	0.5823	0.283		

Table 3.1: Group comparison completed and withdrawn participants.
*statistically significant result

3.1.2 Non-waitlist group and waitlist group

No significant differences between the groups were found based on a Chi-squared test for gender (χ^2=0.07, p=0.617), based on Whitney-Mann-tests for age (U=18.00, p=0.731), better ear 4-PTA (U=15.00, p=0.445), worse ear 4-PTA (U=9.00, p=0.101), nor SNR loss (U=19.00, p=0.836). Therefore, the groups were collapsed for study questions two to four. The results are summarised in table 3.2.

Variable	Group	N	Male	Female	χ2	p
Gender	Non-waitlist	7	3	4	0.07	0.617
	Waitlist	6	3	3		

Variable	Group	N	Mean	SD	U	p
Age	Non-waitlist	7	57.00	2.236	18.00	0.666
	Waitlist	6	56.67	5.680		
Better ear 4-PTA in dB HL	Non-waitlist	7	18.21	11.150	15.00	0.389
	Waitlist	6	19.38	5.800		
Worse ear 4-PTA in dB HL	Non-waitlist	7	22.50	10.080	9.00	0.830
	Waitlist	6	38.13	22.590		
SNR loss in dB	Non-waitlist	7	4.50	5.130	19.00	0.774
	Waitlist	6	2.92	2.440		

Table 3.2: Group comparison non-waitlist and waitlist groups

3.2 Study questions

3.2.1 Study question 1

The first study question was “Is there a significant difference between pre-group and waitlist assessment outcomes?”

For this analysis, the means of the pre-group and waitlist assessment outcomes of the non-waitlist group (n= 6) were compared.

All three outcome measures confirmed that there were no significant changes during the waitlist period, indicating that initial testing was not reactive and that participants’ perceptions did not change while on the waitlist. The study question was therefore answered as “no.” The results of the section are summarised in table 3.3.

3.2.1.1 International Outcome Inventory – Alternative Intervention

The mean of the pre-group assessment IOI-AI was 16.83 with a standard deviation of 4.491. The mean of the waitlist assessment was 18.00 with a standard deviation (SD) of 4.290. There was no significant difference between pre-group and waitlist assessments (Z= -0.406, p= 0.684). The effect size d was -0.266.

3.2.1.2 Hearing Handicap Inventory for Adults

The mean HHIA Total pre-group assessment was 36.33 with a standard deviation of 17.409, while the mean of the waitlist assessment was 36.00 with a standard deviation of 19.960. There was no significant difference between the means of the pre-group and the waitlist assessments (Z= -0.135, p= 0.892). The effect size d was 0.018.

The mean HHIA Social was 18.00 for the pre-group assessment with a standard deviation of 7.483. The mean of the waitlist assessment was 19.00 with a standard deviation of 8.649. There was no significant difference between the means of the pre-group and waitlist assessments (Z= -0.184, p= 0.854). The effect size d was -0.124.

The mean HHIA Emotional was 18.33 for the pre-group assessment with a standard deviation of 10.386. The mean waitlist assessment was 17.00 with a standard deviation of 12.182. There was no significant difference between the means of the pre-group and waitlist assessments (Z= -0.406, p= 0.684). The effect size d was 0.117.

3.2.1.3 Cognitive Anxiety Scale

The mean pre-group assessment CAS was 0.6792 with a standard deviation of 0.381. The mean waitlist assessment was 0.8503 with a standard deviation of 0.346. There was no significant difference between the means of the pre-group and the waitlist assessments (Z= -1.572, p= 0.116). The effect size d was 0.470.

Outcome measure	Assessment	N	Mean	SD	Z	p	d
IOI-AI	Pre-group	6	16.83	4.491	-0.406	0.684	-0.266
	Waitlist	6	18.00	4.290			
HHIA total	Pre-group	6	36.33	17.409	-0.135	0.892	0.018
	Waitlist	6	36.00	19.960			
HHIA Social	Pre-group	6	18.00	7.483	-0.184	0.854	-0.124
	Waitlist	6	19.00	8.649			
HHIA Emotional	Pre-group	6	18.33	10.386	-0.406	0.684	0.117
	Waitlist	6	17.00	12.182			
CAS	Pre-group	6	0.6792	0.381	-1.572	0.116	0.470
	Waitlist	6	0.8503	0.346			

Table 3.3: Summary pre-group / waitlist assessment analysis

3.2.2 Study question 2

The second study question was “Is there a significant difference between pre-group and post-group assessment outcomes?”

For this question, the pre-group and post-group assessment outcomes of all participants who completed the group (n=13) were analysed. Due to technical difficulties, three CAS interviews of the post-group assessment of the waitlist group were lost. For this variable, only ten participants (n=10) contributed to the scores.

All three outcome measures showed significant improvements in their means. However, the means of the HHIA Social did not change significantly. Therefore, the study question is answered as “partially.” The results of the section are summarised in table 3.4.

3.2.2.1 International Outcome Inventory – Alternative Intervention

The mean of the IOI-AI pre-group assessment was 17.31 with a standard deviation of 4.366, while the mean of the post-group assessment was 24.38 with a standard deviation of 1.981. The Wilcoxon Signed Ranks test confirmed a statistically significant change (Z= -2.946, p= 0.003). The effect size d was -2.085.

3.2.2.2 Hearing Handicap Inventory for Adults

The mean of the HHIA Total was 34.00 in the pre-group assessment with a standard deviation of 13.660. The mean post-group assessment was 29.38 with a standard deviation of 13.550. This reflected a statistically significant change (Z= -2.050, p= 0.040). The effect size d was 0.340.

The mean of the HHIA Social showed no significant change (Z= -1.235, p= 0.217), with a pre-group mean of 16.31 (SD 5.936) and post-group mean of 14.92 (SD 7.100). The effect size d was 0.214.

The mean of the HHIA Emotional for the pre-group assessment was 17.85 (SD 8.620), while the mean of the post-group assessment was 13.69 (SD 8.280). It was statistically significant (Z= -2.426, p= 0.015). The effect size d was 0.492

3.2.2.3 Cognitive Anxiety Scale

The mean of the CAS for the pre-group assessment was 0.8329 with a standard deviation of 0.332. The post-group assessment mean was 0.5839 with a standard deviation of 0.2247. This change was statistically significant (Z= -2.293, p= 0.022). The effect size d was 0.734.

Outcome measure	Assessment	N	Mean	SD	Z	p	d
IOI-AI	Pre-group	13	17.31	4.366	-2.946	0.003*	-2.085**
	Post-group	13	24.38	1.981			
HHIA total	Pre-group	13	34.00	13.660	-2.050	0.040*	0.340
	Post-group	13	29.38	13.550			
HHIA Social	Pre-group	13	16.31	5.936	-1.235	0.217	0.214
	Post-group	13	14.92	7.100			
HHIA Emotional	Pre-group	13	17.85	8.620	-2.426	0.015*	0.492
	Post-group	13	13.69	8.280			
CAS	Pre-group	10	0.8329	0.332	-2.293	0.022*	0.734**
	Post-group	10	0.5839	0.225			

Table 3.4: Summary pre-group / post-group assessment analysis
*statistically significant result
**clinically significant result

3.2.3 Study question 3

The third study question was “Is there a significant difference between post-group and follow-up assessment outcomes?”

The outcome measures of the post-group and follow-up assessments of all participants who completed the group were analysed. One person failed to attend the follow-up meeting

(n= 12). In consequence of the three lost CAS interviews, only 10 participants' CAS scores contributed this analysis (n= 10).

The results of the outcome measure did not show any statistically significant differences in any area, answering the study question as "no." The summary of the results are shown in table 3.5.

3.2.3.1 International Outcome Inventory – Alternative Intervention

The mean IOI-AI post-group assessment was 24.38 (SD 1.980) while the follow-up assessment mean was 25.58 (SD 3.397). There was no statistically significant difference between the assessments (Z= -1.647, p= 0.100). The effect size d was -0.432.

3.2.3.2 Hearing Handicap Inventory for Adults

The mean post-group assessment of the HHIA Total was 29.38 (SD 13.550) and the mean follow-up assessment was 23.83 (SD 10.140). There was no statistically significant difference between the assessments (Z= -1.791, p= 0.073). The effect size d was 0.464.

Neither the HHIA Social (Z= -1.394, p= 0.163) nor the HHIA Emotional (Z= -1.435, p= 0.151) showed significant changes from post-group to follow-up assessment.

The mean of the HHIA Social was 14.92 (SD 7.100) for the post-group assessment and 13.00 (SD 4.936) for the follow-up assessment. The effect size d was 0.314.

The mean HHIA Emotional for the post-group assessment was 13.69 (SD 8.280) while the follow-up assessment mean was 10.83 (SD 6.058). The effect size d was 0.394.

3.2.3.2 Cognitive Anxiety Scale

The mean CAS for the post-group assessment was 0.5839 with a standard deviation of 0.225, while the mean follow-up assessment was 0.5257 with a standard deviation 0.165. There was no statistically significant change in the scores (Z= -1.125, p= 0.260). The effect size d was 0.296.

Outcome measure	Assessment	N	Mean	SD	Z	p	d
IOI-AI	Post-group	12	24.38	1.980	-1.647	0.100	-0.432
	Follow-up	12	25.58	3.397			
HHIA total	Post-group	12	29.38	13.550	-1.791	0.073	0.464
	Follow-up	12	23.83	10.140			
HHIA Social	Post-group	12	14.92	7.100	-1.394	0.163	0.314
	Follow-up	12	13.00	4.936			
HHIA Emotional	Post-group	12	13.69	8.280	-1.435	0.151	0.394
	Follow-up	12	10.83	6.058			
CAS	Post-group	10	0.5839	0.225	-1.125	0.260	0.296
	Follow-up	10	0.5257	0.165			

Table 3.5: Summary post-group / follow-up assessment analysis

3.2.4 Study question 4

The fourth study question was "Is there a significant difference between pre-group and follow-up assessment outcomes?"

The outcome measures of the pre-group and follow-up assessments of all participants who attended the follow-up meeting were analysed (n= 12).

The results showed statistically and clinically significant results in all outcome measures, answering the study question as "yes." The summary of the results are shown in table 3.6.

3.2.4.1 International Outcome Inventory – Alternative Intervention

The mean IOI-AI pre-group assessment was 17.31 (SD 4.366) while the follow-up assessment mean was 25.58 (SD 3.397). There was a statistically significant difference between the assessments (Z= -2.810, p= 0.005). The effect size d was -2.114.

3.2.4.2 Hearing Handicap Inventory for Adults

The mean pre-group assessment of the HHIA Total was 34.00 (SD 13.663) and the mean follow-up assessment was 23.83 (SD 10.143). There was a statistically significant difference between the assessments (Z= -2.805, p= 0.005). The effect size d was 0.845.

The mean of the HHIA Social was 16.31 (SD 5.936) for the pre-group assessment and 13.00 (SD 4.936) for the follow-up assessment. There was a statistically significant difference between the assessments (Z= -2.161, p= 0.031). The effect size d was 0.606.

The mean HHIA Emotional for the pre-group assessment was 17.85 (SD 8.620) while the follow-up assessment mean was 10.83 (SD 6.058). There was a statistically significant difference between the assessments (Z= -2.755, p= 0.006). The effect size d was 0.942.

3.2.4.3 Cognitive Anxiety Scale

The mean CAS for the pre-group assessment was 0.8329 with a standard deviation of 0.332, while the mean follow-up assessment was 0.5257 with a standard deviation 0.165. There was a statistically significant difference between the assessments (Z= -2.510, p= 0.012). The effect size d was 1.171.

Outcome measure	Assessment	N	Mean	SD	Z	p	d
IOI-AI	Pre-group	12	17.31	4.366	-2.810	0.005*	-2.114**
	Follow-up	12	25.58	3.397			
HHIA total	Pre-group	12	34.00	13.663	-2.805	0.005*	0.845**
	Follow-up	12	23.83	10.143			
HHIA Social	Pre-group	12	16.31	5.936	-2.161	0.031*	0.606**
	Follow-up	12	13.00	4.936			
HHIA Emotional	Pre-group	12	17.85	8.620	-2.755	0.006*	0.942**
	Follow-up	12	10.83	6.058			
CAS	Pre-group	12	0.8329	0.332	-2.510	0.012*	1.171**
	Follow-up	12	0.5257	0.165			

Table 3.6: Summary pre-group / follow-up assessment analysis
*statistically significant result
**clinically significant result

3.2.5 Study question 5: online questionnaire

The fifth study question was “Do participants take steps to implement communication strategies?” This question was answered by comparing questions three and four of the online questionnaire, which asked in which listening situations the participants (n= 13) implemented communication strategies directly after the end of the programme and three months later. The listening situations were given as “on the phone”, “in meetings”, “one-on-one” and “in background noise.”

Immediately after the programme, two participants (15%) implemented communication strategies on the phone, five participants (38%) implemented them in meetings, five members (38%) in one-on-one situations and all 13 participants (100%) implemented communication strategies in background noise.

Three months after the end of the programme, a total of four members (31%) still used communication strategies on the phone, eight members (62%) used them in meetings, six

members (46%) in one-on-one situations and all 13 members (100%) still used communication strategies still in background noise. All listening areas showed increased use of communication strategies apart from background noise, which was already saturated at 100% after the programme. Figure 3.1 shows the increasing use of communication strategies in different listening situations.

These results answered the study question as "yes."

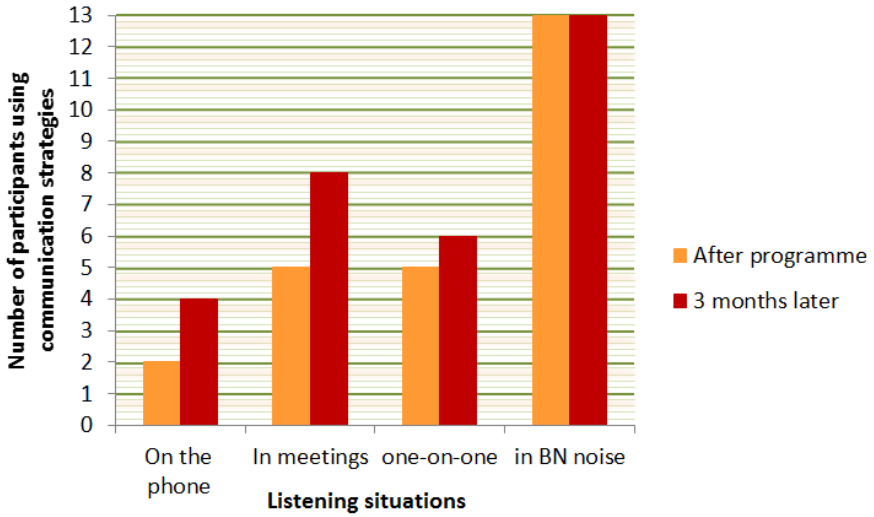


Figure 3.1: Increasing use of communications strategies

3.3 Group processes

3.3.1 Non-Waitlist Group

The non-waitlist group started with nine members in the first session, with two members electing to withdraw after that. The remaining group members were homogenous in regards of cultural background, age, education level and occupation. This translated into good bonding and peer support during the programme. The members were very involved in the programme, sharing equally information and experiences with each other. This resulted in feedback, creating a positive and safe working environment for the participants.

The member of this group identified their main areas of difficulties in the first session as:

- Telephone
- Background noise
- Familiarity of the speaker
- Attitude from others
- Internal factors

Internal factors related to the way participants generally dealt with communication breakdowns: passive, active, assertive etc.

These topics were revisited in the last meeting. Each member commented on their own original concerns, reflecting on progress made. Others shared their learning experiences about this topic when they felt it contributed a different point of view. Learning about communication and hearing loss were identified as useful. Meeting others with hearing loss and communication problems helped all participants to understand and normalise their own situation. A general feeling of achievement was expressed by all members.

3.3.2 Waitlist Group

Due to irregular attendance, the waitlist group lacked cohesion. Five members withdrew before and during the programme. Only three members attended the third session, the remaining three participants agreed to a catch-up session one week later. The group was homogenous regarding age, but cultural background, education level and occupation varied to a wider degree than in the non-waitlist group. The group processes were carried by strong individuals rather than the whole group.

The group members identified their main area of difficulty in the first session as:

- Telephone
- Background noise
- TV
- Communicating in the outdoors
- Pronunciation

These areas of difficulties were re-visited in session three. The topics were discussed by the present contributors. Topics that were contributed by an absentee were discussed by the group as a whole. A general feeling of achievement was expressed by all members.

4. DISCUSSION

The purpose of this study was to evaluate the outcomes of a new audiologic rehabilitation (AR) group programme "See it! Hear it! Say it!" in the New Zealand context. The study design was a quasi-randomised pre-test / post-test / follow-up with waitlist design. Measures were repeated three times for the non-waitlist group: in a pre-group assessment, within two weeks of starting the AR programme; in a post-group assessment, immediately after finishing the AR programme; and in a follow-up assessment, twelve weeks after finishing the AR programme. The waitlist group was assessed additionally a fourth time after the waitlist period, immediately before the first group meeting.
Three outcome measures were employed: International Outcome Inventory – Alternative Interventions (IOI-AI; Noble, 2002), Hearing Handicap Inventory for Adults (HHIA; Newman, Weinstein, Jacobson & Hug, 1990), and Cognitive Anxiety Scale (CAS; Viney & Westbrook, 1976; DiLollo, Manning & Neimeyer 2003).

The study questions were:

1. Is there a significant difference between pre-group and waitlist assessment outcomes?
2. Is there significant difference between pre-group and post- group assessment outcomes?
3. Is there a significant difference between post-group and follow-up assessment outcomes?
4. Is there a significant difference between pre-group and follow-up assessment outcomes?
5. Do participants take steps to improve communication in the workplace?

4.1 Participants

The sample size calculated in a *priori* power analysis required a minimum 16 participants for a clinically relevant effect size d of 0.500 with 80% power and an alpha of 0.05. Although 20 participants initially enrolled and underwent pre-group assessments, seven participants withdrew and the study was left slightly underpowered.

The participants who completed the programme were diverse in their level of hearing impairment. Most participants had a minimal audiometric loss while three had a significant

hearing impairment. This diversity decreased the statistical power. It was further decreased by using non-parametric statistics which had to be employed due to the small number of participants.

The participants who withdrew from the programme had a significantly worse mean (29.11 dB HL) in their better ear four frequency puretone average (4-PTA) than the participants who completed the programme (4-PTA mean 18.75 dB HL). The better ear 4-PTA is relevant for the participants' hearing as it defines the minimum sensation level for sound, possibly giving the withdrawal group a more difficult communication experience than the group who completed the programme. The group who withdrew had slightly worse means in the HHIA than the group who completed the programme, which could be a reflection of the more difficult communication experience. The participants who withdrew also had lower CAS levels with a large effect size of d= 0.812. It might be speculated that the group who withdrew did not experience enough cognitive anxiety to find the AR programme useful. However, while two participants withdrew for unknown reasons, five participants withdrew due to illness. Therefore, audiometric and CAS results might have played a minor role in decisions leading to withdrawal. The reported adherence rate was with 65% similar to other studies (Hickson, Worrall & Scarinci, 2007).

4.2 Study question 1

Study question one focussed on the change of means between pre-group and waitlist assessments. This was done in order to evaluate the "treatment effect" of the waitlist period. In other words, it was determined if the pre-group and hearing assessments were a reactive test arrangement or if participants changed their perceptions during the waitlist period. During the pre-group assessments, the participants spoke about their experiences with hearing impairment and answered written questions. During the hearing assessment and through explanations of the results, they learnt about their hearing impairment and were able to clarify questions they might have had. Going through this process could have given participants enough information about hearing impairment to change their hearing handicap and stigma perceptions.

None of the outcome measures showed statistically significant changes during the waitlist period; therefore the study question was answered negative.

4.2.1 International Outcome Inventory – Alternative Outcomes and Hearing Handicap Inventory for Adults

There were no significant differences between the means of the pre-group and the waitlist assessments for the IOI-AI and the HHIA. Effect sizes d were small in IOI-AI (d = -0.266), HHIA Total (d = 0.018), HHIA Social (d = -0.124) and HHIA Emotional (d = 0.117). It is likely that participants' perceptions truly did not change during the waitlist period.

4.2.2 Cognitive Anxiety Scale

The biggest effect size was measured for CAS (d = 0.470), which showed an increased mean in the waitlist assessment compared to the pre-group assessment. The effect size nearly reached clinical significance.

There are two possible reasons for this increase. First, the waitlist measurement was administered immediately before the first group meeting. Participants might have been in a heightened state of cognitive anxiety as they might have been nervous in the face of the possibility of communication breakdowns during the group session. Another reason for increased CAS levels might be that the pre-group assessment was reactive enough to make participants aware of their own limitations. This awareness could have caused a higher level of cognitive anxiety as they noticed communication processes and their breakdowns more often than they had before the pre-group and hearing assessments.

CAS was also trialled as an outcome measure for stigma-induced identity threat. If CAS was indeed a true reflection of stigma-induced identity threat, the increase between pre-group and waitlist assessment outcomes for CAS is most interesting. At the pre-group assessment, participants had the first contact with the researcher, but they were aware that the group would start at a later point in time. Therefore, they might have felt a lower level of stigma-induced identity threat, reflected in a lower CAS mean. The waitlist assessment, however, was administered immediately before the first group meeting. The intervention was about to begin and participants had to confront a potentially embarrassing issue in a group of strangers. This immediate threat could have been expressed in a higher CAS mean. These results would be similar to results and observations made in other studies (Kelly, Neimeyer & Wark, 2011; Claesen & Pryce, 2012).

In one study (Claesen & Pryce, 2012), participants were interviewed just before a first

audiology appointment; in their interview, they painted a very dark picture of hearing impairment, magnifying all negative traits and stereotypes available. This attitude could be interpreted in a way that it suggests that participants felt a high degree of identity threat just before they had to confront the realities of their hearing impairment. The participants in the present study were in a similar situation in the waitlist assessment and also displayed a heightened level of identity threat. Unfortunately, Claesen and Pryce did not measure cognitive anxiety or stigma-induced identity threat, therefore this comparison remains speculation.

Kelly, Neimeyer and Wark (2011) measured CAS in different stages of help-seeking in the context of hearing aid intervention. They also found that CAS levels were highest immediately before the first audiology appointment, possibly indicating a heightened identity threat posed by the appointment.

4.3 Study question 2

Study question two was directed at the short-term effect that the AR programme had on the participants. The post-group assessment was administered immediately after finishing the programme so that change would be measured close to the time of impact. Most outcome measures showed statistically and clinically significant changes from pre-group to post-group assessments. Study question two was answered as "partially."

4.3.1 International Outcome Inventory – Alternative Outcomes

The effect size d = -2.085 was much larger than the pre-set clinically significant effect size of 0.500. There are two possible explanations for this phenomenon.

The first explanation is that the IOI-AI measured outcomes well, even in an administration mode that it was not originally intended for. If that was the case, an effect size of -2.085 was an excellent outcome and showed that the AR programme produced outstanding improvements in the areas usage, benefits, residual activity limitations, satisfaction, residual participation restrictions, impact on others and quality of life.

The other possibility is that the effect size was an artefact produced by the way the questionnaire was administered. Although conceptualised as outcome measure only, it was employed as a pre-post measure. This might have overstretched the boundaries of meaning of the IOI-AI. Examples can be seen in the wording of question 2: "Think about the situation

where you most wanted to hear better, before training on communication strategies. Over the past 2 weeks, how much have communication strategies helped in that situation?" and question 3: "Think again about the situations where you most wanted to hear better. When you use communication strategies, how much difficulty do you STILL have in that situation?" These two questions asked specifically about before-and-after experiences which the participants did not have in the pre-treatment assessments. During pre-group and waitlist assessments, participants frequently commented on this fact and asked for clarification. In this context, the high effect size d might be an artefact produced by the circumstance that the assessment *after* the treatment was the only time when the questionnaire was a meaningful reflection of the participants' perceptions.

On the other hand, the achieved post-group assessment outcomes should be most relevant for the evaluation of the AR programme as they are the intended purpose of the IOI-AI. Although there were not enough participants to analyse the means of each question, the overall mean could be compared with other studies. Hickson, Worrall and Scarinci (2007) used the IOI-AI as post-group outcome measure for their five week AR programme and reported results for 178 participants. When compared to the participants in this study, those participants were much older (mean age 73.87 years, SD 8.29 years), had a more severe hearing impairment (better ear 4-PTA 41.33 dB HL, SD 12.21 dB) and just over half were hearing aid users. Although study population, length and content of the AR programmes were different, the post-group mean of 25.89 was similar to the post-group mean of 24.38 in the present study. This fact supports the claim that the post-group mean is valid, although the IOI-AI was administered as a pre-post measure.

4.3.2 Hearing Handicap Inventory for Adults

Although statistically significant (p= 0.040), the effect size d (0.340) for the HHIA Total did not reach the pre-set clinically significant value of 0.500. While the subscale HHIA Social did not reach statistical (p= 0.217) nor clinical significance (d= 0.214), the subscale HHIA Emotional reached statistical (p= 0.015), and was very close to reaching clinical significance (d= 0.492).

Improvements were achieved in all HHIA scores; however, they were small in HHIA Total and HHIA Social, but showed nearly clinically significant effect size in HHIA Emotional. The HHIA Total mean reduced from 34.00 (34% of the best possible score) by five percent

points to 29.38 (29% of the best possible score). The HHIA Social mean reduced from 16.31 (34% of the best possible score) by three percent points to 14.92 (31% of the best possible score) and the HHIA Emotional mean reduced from 17.85 (34% of the best possible score) by eight percent points to 13.69 (26% of the best possible score). Although hearing handicap was felt on both subscales initially at the same level, the AR programme had a bigger impact on the emotional scores of the hearing handicap perception than on the social scores.

The positive outcome on the HHIA per se is not surprising, considering that the AR programme was designed to reduce hearing impairment related stigma felt by the participants. But it was also designed to reduce activity limitations and participation restrictions by teaching about adverse listening situations and communication strategies. This goal was not reflected in the results of the HHIA Social in the post-group assessment.
One explanation for missing improvements in activity limitations and participation restrictions would be that the HHIA scores were already low at the pre-group assessment and a ceiling effect restricted the room for improvement. This phenomenon had also been observed in previous pilot studies of this AR programme (Kelly-Campbell, in press).
Another explanation could be that the post-group assessment was done immediately after the group meeting in which the participants learnt about communication strategies. The participants simply had not had a chance to implement them in their daily lives and so reduce their activity limitations and participation restrictions.

4.3.3 Cognitive Anxiety Scale

There were statistically and clinically significant changes in CAS pre-group and post-group means with an effect size d= 0.734.

The results showed that cognitive anxiety was present in participants before the programme and was significantly reduced after the programme. The pattern of cognitive anxiety levels parallels the findings of Kelly, Neimeyer and Wark (2011) who measured cognitive anxiety in the context of intervention with hearing aids. The group who were interviewed before their first consultation showed significant higher cognitive anxiety levels than the group who had gone through the intervention. In the present study, participants had also higher levels of cognitive anxiety before they started and reduced levels when they had finished their intervention. The lower levels of cognitive anxiety after the intervention in both studies could reflect a higher sense of control, being able to appraise and predict social interactions more successfully than before.

If CAS was a true measure for stigma-induced identity threat, a significantly reduced CAS level at the post-group assessment meant that the AR programme had significantly eased the identity threat for the participants. The first step of the normalisation process (Hétu, 1996), was successful and participants were able to negotiate new positive identities for themselves.

4.4 Study question 3

None of the outcome measures showed statistically significant change from post-group to follow-up assessment. Therefore, study question three was answered negative. Outcomes continued to improve and showed notable, although not significant, effect sizes in IOI-AI (d= -0.432), HHIA Total (d= 0.464), HHIA Social (0.314) and HHIA Emotional (d= 0.394). The smallest effect size was found in CAS (d= 0.296).

If CAS was a true measure for stigma-induced identity threat, the lack of change between post-group and follow-up assessment means could reflect the fact that most stigma reduction, or normalisation after Hétu (1996), was achieved during the group meetings. Sharing experiences with hearing impaired peers had already reduced the feelings of shame, guilt and having a 'spoilt identity'. The follow-up period represented the second step in Hétu's normalisations process, when group members take their new knowledge and self-esteem into their 'natural' environments. Further significant improvements in stigma perception during this time is not be expected, as the largest part of stigma reduction had been already achieved during the group phase.

In contrast, IOI-AI and HHIA Total showed effect sizes that were nearly clinically significant. As discussed in 4.2, participants might now have had time to implement communication strategies into their daily lives and so reduce activity limitations and participation restrictions. As the statistical power of the study was reduced due to the number and diversity of participants, it can be speculated that, with more statistical power, effect sizes might have reached clinical significance.

4.5 Study question 4

Study question four was directed at the mid-term effect that the AR programmes had on the participants. All outcome measures showed statistically and clinically significant changes from pre-group to follow-group assessments. Study question four was answered as "yes".

4.5.1 International Outcome Inventory for Adults

The comparison between pre-group and follow-up IOI-AI assessments was statically and clinically significant. The effect size d was -2.114.

As discussed before, there is a possibility that the size of d reflects an artefact due to the usage of the questionnaire. If that was true, an even bigger effect size in question four than found in question two is still meaningless.
Should d not be an artefact, the effect size for the comparison between pre-group and follow-up assessment would be even bigger between pre-group and follow-up assessments. This would mean that the programme was not only effective in short-term, but even more so in mid-term time periods. The improvements seen at the post-group assessment were not only maintained, but also continued to increase during the follow-up period.

4.5.2 Hearing Handicap Inventory for Adults

The comparison between pre-group and follow-up HHIA assessments was statically and clinically significant. The effect size for HHIA Total was d= 0.845, for HHIA Social was d= 0.606, and for HHIA Emotional d= 0.942.

The effect sizes for study question two were initially not clinically significant. This might have been due to the lacking statistical power in this study and the time needed to implement changes in participants' daily lives. However, with the additional improvements achieved during the follow-up period, all effect sizes reached clinical significance between pre-group and follow-up assessment. The perception of hearing handicap – also expressed as activity limitations and participation restrictions – was significantly reduced after the follow-up period compared to the pre-group assessment.

4.5.3 Cognitive Anxiety Scale

The comparison between pre-group and follow-up CAS assessment was statically and clinically significant. The effect size was d= 1.171.

Cognitive anxiety was present at the pre-group assessment, was significantly reduced at the post-group assessment, and was further reduced during the follow-up period. It can be stated that the AR programme worked effectively in the area of cognitive anxiety as it reduced it more than one standard deviation over the course of at least 15 weeks.

If CAS was a true measure of stigma-induced identity threat, the effect size showed the magnitude of change that this AR programme achieved in stigma perception. Normalisation was a major goal of the programme and the results showed that this goal was achieved effectively.

4.6 Study question 5

The results of the online questionnaire showed that participants implemented communication strategies to a different degree in various listening situations. All participants implemented them in background noise, but only half of the participants implemented communication strategies in meetings or one-on-one situations and only four participants had implemented them on the telephone at the follow-up assessment.

However, a comparison with question one of the questionnaire might put this result into context. In question one, participants stated areas in which are they initially had communication difficulties. No participant reported having difficulty in one-on-one situations. Two participants reported having difficulties in meetings and on the telephone and all thirteen participants reported that they had difficulties in background noise. When comparing the implementation results to the original areas of difficulties, it becomes clear that more participants used communication strategies in each listening situation than had originally identified them as being difficult. All 13 participants had identified background noise as difficult listening environment, so it is not surprising that all 13 used communication strategies in background noise. However, while two participants had originally identified the telephone as difficult listening situation, four participants used communication strategies on the telephone12 weeks after the programme. Similar observations can be made for the listening situations of meetings and one-on-one situations. Two participants had identified meetings as a difficult listening situation; at the follow-up assessment, eight participants used communication strategies in meetings. No participant stated originally that they had difficulties in one-on-one situations, yet six persons used communication strategies in one-on-one situations at the follow-up assessment. In summary, more participations implemented communication strategies in specific listening situations than had previously stated as having difficulties in. This could be interpreted as participants having a raised awareness of the importance of communication strategies in many listening situations.

4.7 Limitations

A number of limitations need to be taken into account when interpreting the results.

4.7.1 Sample

Socio-economic factors were only comparable to New Zealand census data (Statistics New Zealand, 2008a) in two categories: ethnicity and type of work. In these two categories, the study sample showed a higher percentage of people with European heritage (86%) than in average in Canterbury (77%), and more participants worked as professionals (62%) than in average in Canterbury (19%). Other categories such as household income were grouped differently to the census so that comparisons could not be made.

It can be stated that most study participants were professionals with a high level of education, living with significant others and/or their adult children, had a good income, were the main income earners for their families and had a high level of job security. In at least two categories, they did not represent the average population in Canterbury. They might be, however, more representative of a help-seeking population with hearing problems. Education played a role in a study by Fisher, Cruickshanks, Wiley, Klein, Klein, and Tweed (2011) about hearing aid acquisition. In that study, college education significantly increased the likelihood of hearing aid acquisition. It might be speculated that the results could be extended to help-seeking for hearing problems in general. If this speculation was true, the sample of the present study might be representative for the help-seeking population.

4.7.2 Inclusion criteria

The inclusion criteria were defined in a way that would allow participants with up to moderate level of hearing impairment to participate. Persons with hearing impairment worse than moderate levels were to be excluded to keep the group homogenous in their experiences. However, the wording of the inclusion criteria was not specific about better hearing and worse hearing ears, but allowed participants with a four frequency puretone average (4-PTA) of 16 – 55 dB HL in at least one ear to participate. This wording led to two candidates qualifying for the study through their better hearing ear, although their worse hearing ear showed a moderately severe loss.

During the group meetings, one participant revealed himself as challenging group member. Although not disruptive, he seemed to struggle to follow instructions, stay on topic and generally not understand group processes. Doubts remained over the reliability of his outcome measure results. Although there was a slight possibility that some of the problems were caused by his hearing impairment, these interpretations difficulties might have been prevented by including a short neurological screening tool in the inclusion criteria.

4.7.3 Audiologic test battery

The Quick Speech-in-Noise (QuickSIN) test was employed to assess speech recognition in noise (QuickSIN). It was only available in American English. The regional accent of English and the lexical selection of words might have caused some participants to score a worse signal-to-noise ratio (SNR) loss than if the test had been available in New Zealand English. The margin of error is unknown as no research estimating error margins when using the QuickSIN with English speakers of non-American regions was available.

4.7.4 Non-standardised retrospective questionnaire

The online questionnaire was a non-standardised, retrospective questionnaire. Reliability and validity were not tested. Generally, retrospective questionnaires ask for previous perceptions of the participants. Recollections of participants might have been influenced by recent events and not be as accurate as if they had been documented at the time (Schneider, 1997). Therefore, this questionnaire might have been a reactive assessment.

4.7.5 Non-blinding

A prospective study with waitlist design would ideally be conducted blinded. This would involve a researcher who was blinded to the group membership administering the assessments and an independent person facilitating the AR programme. Due to resource restrictions this was not possible. The researcher conducted the hearing assessment, data collection and acted as facilitator of the AR programme. Non-blinding could lead to researcher bias and exaggerated benefit outcomes (Schiavetti & Metz, 2002).
Researcher bias includes conscious and subconscious manipulations of participants, biased questioning or not exploring variables that lead to certain outcomes.
Exaggerated benefits outcomes could be caused by two effects. Firstly, the Hawthorne effect

describes a phenomenon of changing behaviour produced by the subject's knowledge that they are participating in an experiment (Schiavetti & Metz, 2002). Secondly, the halo effect (Thorndike, 1920) describes a phenomenon of inflated benefit score as participants want to please clinicians. Schulz, Chalmers, Hayes & Altman (1995) estimated that non-blinded studies might exaggerate the effects of health-care interventions by up to 40%.

4.8 Implications and further research

Hearing impairment is a chronic health condition that is demarcated by activity limitations and participation restrictions as defined by the International Classification of Functioning, Disability, and Health (ICF) of the World Health Organisation (WHO, 2001). However, it is also a health condition that carries a stigma (Hétu, 1996) which very much defines help-seeking behaviours. When designing a new AR programme, both aspects need to be considered and addressed.

The outcomes of this study have several implications. The results of question two and three clarified that the AR programme addressed both aspects of hearing impairment, but each at different times. At the post-group assessment, the major improvement was felt in stigma related scores of CAS and HHIA. However, there were indications that activity limitations and participation restrictions were not greatly decreased at this point. At the follow-up assessment, 12 weeks after finishing the programme, the stigma perception was further decreased, but only by a slight margin. Activity limitations and participation restrictions were also further reduced, and showed noticeable effect sizes. From these results it might be concluded that stigma perception was mainly addressed during the AR programme, while activity limitations and participation restrictions were reduced over the follow-up period, after the programme had finished.

Hétu and Getty (1991) stressed the importance of including partners and/or other significant communication partners in an AR programme. Although this was considered, the main aspect of this study was to adapt the AR programme "See it! Hear it! Say it!" to the New Zealand context. Further research is needed to develop a variation of the programme that includes significant communication partners.

The reliability of the results of one participant remained in doubt due to his difficulty in following group processes and instructions during outcome assessments. Other studies into AR groups reported inclusion criteria that aim at the suitability for a person to participate in

group programmes. Chisholm, Abrams and McArdle (2004) assessed participants with the Mini-Mental State Exam (Folstein, Folstein & McHugh, 1979). Others (Hickson, Worral & Scarinci, 2007 and 2006) relied on self-report and judgement of the researcher in order to detect memory problems and neurological impairments. In future studies, similar measures need to be included into the inclusion criteria in order to obtain reliable results.

The IOI-AI was used as a pre-post measure although it was designed as an outcome measure only. The effect size for the comparison between pre-group and post-group assessments was very high, which could indicate excellent outcomes. There is, however, also a possibility that the effect size is an artefact due the pre-post design. There were indications in pre-group and waitlist assessments that the content of the questionnaire did not carry any meaning for participants at that point in time and they were forced into answer categories that were meaningless to them. On the other hand, means between pre-group and waitlist assessments did not change significantly. This could be interpreted in a way that pre-intervention scores might have some validity. More research is needed to determine the psychometric properties of the IOI-AI.

CAS was used to identify cognitive anxiety levels at different stages of the intervention. It was also employed as experimental outcome measure for stigma-induced identity threat. The results supported that cognitive anxiety was present before the start of the AR programme and reduced after the programme. Interpretations of the CAS scores regarding stigma-induced identity threat were meaningful and could be related back to other research. Further research with a multitrait/multimethod matrix approach (Campbell & Fiske, 1959; Shaddish, Cook & Campbell, 2002) is needed to verify that CAS is an appropriate outcome measure for stigma-induced identity threat.

Additionally, it might be desirable to include qualitative research elements into further studies. Gagné (2003) urges documenting facilitators and obstacles, as well as impacts and consequences of a programme. Facilitators and obstacles are factors that act in a facilitating or inhibiting manner towards the implementation of the programme objectives. Impacts and consequences are changes that occur as a result of the AR programme, although they were not specifically targeted. Collecting this information might help getting a more complete understanding of the impact of the AR programme

The study had reduced statistical power due to sample and diverse sample size and the use of non-parametric statistics. Further studies with more participants are needed to substantiate the results of the present study.

5. REFERENCES

Abrams, H., Chisholm, T., Guerreiro, S., & Ritterman, S. (1992). The effects of intervention strategy on self-perception of hearing handicap. *Ear and Hearing, 13*, 371-377.

Abrams, H., Chisholm, T., & McArdle, R. (2002). A cost-utility analysis of adult group audiologic rehabilitation: are the benefits worth the costs? *Journal of Rehabilitation Research and Development, 39*, 549-558.

Abrams, H., Chisholm, T., & McArdle, R. (2005). Health-related quality of life and hearing aids: a tutorial. *Trends in Amplification, 9*, 99-109.

Aiello, C., De Lima, I., & Ferrari, D. (2011). Validity and reliability of the hearing handicap inventory for adults. *Brazilian Journal of Otorhinolaryngology, 77*, 432-438.

American Speech-Language-Hearing Association. (1998). Determining threshold level for speech [Guidelines]. *Available from* www.asha.org/policy.

Anderson, G. & Green, M. (1995). Anxiety in elderly hearing impaired persons. *Perceptual and Motor Skills 81,* 552 – 554.

Bahn, J., Singh, G., & Pichora-Fuller, M. K. (2012). Age affects responses on the Speech, Spatial, and Qualities of Hearing Scale (SSQ) by adults with minimal audiometric loss. *Journal of the American Academy of Audiology, 23*, 81-91.

Barlow, J., Wright, C., Sheasby, J., Turner, A., & Hainsworth, J. (2002). Self-management approaches for people with chronic conditions: a review. *Patient Education and Counselling, 48*, 177-187.

Bench, J., Daly, N., Doyle, J., & Lind, C. (1995). Choosing talkers for the BKB/A speechreading test: A procedure with observations on talker age and gender. *British Journal of Audiology, 31*, 172-187.

Berger, K. W. (1972). *Speechreading: Principals and Methods*. Baltimore: National Education Press.

Beynon, G., Thornton, F., & Poole, C. (1997). A randomized, controlled trial of the efficacy of a communication course for first time hearing aid users. *British Journal of Audiology, 31*, 345-351.

Black, B. (1999): *An introduction to ear disease.* Singular Publishing Group, San Diego, USA.

Blood, G. W., Blood, I. M., & Danhauer, J. L. (1977). The hearing aid effect. *Hearing Instruments, 28*, 12.

Boothroyd, A., & Nittrouer, S. (1988). Mathematical Treatment of Context Effects in Phoneme and Word Recognition. *Journal of the Acoustical Society of America,, 84*, 101-114.

Brewer, D. M. (2001): Considerations in measuring effectiveness of group rehabilitation classes. *Journal of the Academy of Rehabilitative Audiology, 34,* 53 – 60.

Brouns, K., El Refaie, A., & Pryce, H. (2011). Auditory training and adult rehabilitation: a critical review of evidence. *Global Journal of Health Science, 3*, 49-63.

Byram, M. & Méndez García, M. d. C. (2009). Communicative Language Teaching. In B. Seidlhofer & K. Knapp (Eds.): *Handbook of Foreign Language Communication and Learning* (pp. 491 - 516). Berlin, New York: De Gruyter Mouton.

Campbell, D. T. & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56(2)*, 81-105.

Caraballese, C., Appollonio, I., Rozzini, R., Bianchetti, A., Frisoni, G. B., Frattola, L., & Trabucchi, M. (1993). Sensory impairment and quality of life in a community elderly population. *Journal of the American Geriatric Society, 41*, 401-407.

Carey, A. (1967). The Hawthorne Studies. *American Sociological Review*, *32*, 403–417.

Chia, E.-M., Wang, J. J., Rochtchina, E., Cumming, R. R., Newall, P., & Mitchell, P. (2007). Hearing impairment and health-related quality of life: The blue mountains hearing study. *Ear and Hearing, 28*, 187-195.

Chio, M., Mikami, I., Takashima, S., Saeki, T., Ohsumi, S., Aogi, K., & Okamura, H. (2005). A feasibility study of psychosocial group intervention for breast cancer patients with first recurrence. *Support Care Cancer, 13*, 503-514.

Chisholm, T., Abrams, H., & McArdle, R. (2004). Short and long-term outcomes of adult audiologic rehabilitation. *Ear and Hearing, 26*, 464-477.

Chisholm, T., Willott, J. F., & Lister, J. J. (2003). The aging auditory system: anatomic and phsysiologic changes and implications for rehabilitation. *International Journal of Audiology, 42*, 2s3-2s10.

Cienkowski, K. M., & Pimentel, V. (2001). The hearing aid 'effect' revisited in young adults. *British Journal of Audiology, 35*, 289-295.

Claesen, E., & Pryce, H. (2012). An exploration of the perspectives of help-seekers prescribed hearing aids. *Primary Health Care Research & Development,, 13*, 279-284.

Clark, J. G. (1981). Uses and abuses of hearing loss classification. *Asha, 23*, 493-500.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*, 37-46.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences*. Hillsdale, NJ: Lawrence Earlbaum Associates.

Cox, R., Hyde, M., Gatehouse, S., Noble, W., Dillon, H., Bentler, R., … Hallberg, L. (2000). Optimal Outcome Measures, Research Priorities, and International Cooperation. *Ear and Hearing, 21,* 106S-115S.

Cruickshanks, K., Wiley, T., Tweed, T., Klein, B., Klein, R., Perlman, M., & Nondahl, D. (1998). Prevalence of hearing loss in older adults in Beaver Dam, Wisconsin. The epidemiology of hearing loss study. *American Journal of Epidemiology, 148*, 879-886.

Daly, N., Bench, J., & Chapell, H. (1996). Gender differences in speechreading ability. *Journal of the Academy of Rehabilitative Audiology, 29*, 27-40.

Danermark, B., & Coniavitis Gellestedt, L. (2004). Psychosocial work environment, hearing impairment, and health. *International Journal of Audiology, 43*, 383-389.

Davies, A., Smith, P., Ferguson, M., Stephens, D., & Gianopoulos, I. (2007). Acceptability, benefit and costs of early screening for hearing disability: a study of potential screening tests and models. *Health Technology Assessment Bulletin, 11*, 42.

Demorest, M. E., & Erdman, S. A. (1986). Scale composition and item analysis of the Communication Profile for the Hearing Impaired. *Journal of Speech and Hearing Research, 29*, 515-535.

DiLollo, A., Manning, W. H., & Neimeyer, R. A. (2003). Cognitive anxiety as a function of speaker role and persons who stutter. *Journal of Fluency Disorders, 28*, 167-186.

Duman, Z. C., Yildirim, N. K., Ucok, A., Er, F., & Kanik, T. (2010). The effectiveness of a psychoeducational group program with inpatients being treated for chronic mental illness. *Social Behaviour and Personality, 38*, 657-666.

Erber, N. P. (1971). Effects of distance on the visual perception of speech. *Journal of Speech and Hearing Research, 17*, 99-112.

Erber, N. P. (1974). Visual perception of speech by deaf children: recent developments and continuing needs. *Journal of Speech and Hearing Disorders, 39*, 178-185.

Field, A. (2005). *Discovering statistics using SPSS*. London: Sage Publications.

Fischer, M. E., Cruickshanks, K. J., Wiley, T. L., Klein B. E., Klein, R. & Tweed, T. S. (2011). Determinants of Hearing Aid Acquisition in Older Adults. *American Journal of Public Health (101)*, 1449-55.

Fleiss, J. L. (1981). *Statistical Methods for Rates and Proportions*. (2nd ed.). New York: John Wiley & Sons.

Folstein, M. F., Folstein, S. E., & McHugh, P. J. (1979). Mini-Mental State: A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research (12)*, 189–198.

Foucault, M. (1998). *Über Hermaphrodismus. Der Fall Barbin.* Frankfurt am Main: Suhrkamp Verlag.

Gagné, J.-P. (2003). Treatment effectiveness research in audiological rehabilitation: Fundamental issues related to dependent variables. *International Journal of Audiology, 42,* S104 – 111.

Gatehouse, S. (1994). Components and determinants of hearing aid benefit. *Ear and Hearing, 15,* 30 – 49.

Gates, G. A., Murphey, M., Rees, T. S., & Fraher, A. (2003). Screening for handicapping hearing loss in the elderly. *The Journal of Family Practice, 52*, 56-62.

Goffman, E. (1963). *Stigma: Notes on the management of spoiled identity*. New York: Simon & Schuster.

Goodman, A. (1965). Reference zero levels for pure-tone audiometers. *Asha, 7*, 262-263.

Gottschalk, L. A., & Gleser, G. C. (1969). *The measurement of psychological states through the content analysis of verbal behavior*. Berkeley: University of California Press.

Greville, A. (2005). *Hearing impaired and deaf people in New Zealand*. Auckland: Greville Consulting.

Hallberg, L. R.-M., Hallberg, U., & Kramer, S. E. (2008). Self-reported hearing difficulties, communication strategies and psychological general well-being (quality of life) in

patients with acquired hearing impairment. *Disability and Rehabilitation, 30*, 203-212.

Hannula, S., Bloigu, R., Majamaa, K., Sorri, M., & Mäki-Torkku, E. (2011). Self-reported hearing problems among older adults: prevalence and comparison to measured hearing impairment. *Journal of the American Academy of Audiology, 22*, 550-559.

Hawkins, D. B. (2005). Effectiveness of counseling-based adult group aural rehabilitation programs: A systematic review of the evidence. *Journal of the American Academy of Audiology, 16*, 485-493.

Helvik, A.-S., Jacobsen, G., & Hallberg, L. R.-M. (2006). Psychological well-being of adults with acquired hearing impairment. *Disability and Rehabilitation, 28*, 535-545.

Hétu, R. (1996). The stigma attached to hearing loss. *Scandinavian Journal of Audiology, 42*, 12-24.

Hétu, R., & Getty, L. (1991). Development of a rehabilitation program for people affected with occupational hearing loss: A new paradigm. *Audiology, 30*(305-316).

Hétu, R., Jones, L., & Getty, L. (1993). The impact of acquired hearing impairment on intimate relationships: Implications for rehabilitation. *Audiology, 32*, 363-381.

Hickson, L., Worrall, L., & Scarinci, N. (2006). Measuring outcomes of a communication program for older people with hearing impairment using the International Outcome Inventory. *International Journal of Audiology, 45*, 236-246.

Hickson, L., Worrall, L., & Scarinci, N. (2007). A randomized controlled trial evaluating the active communication education program for older people with hearing impairment. *Ear and Hearing, 28*, 212-230.

High, W., Fairbanks, G. & Glorig. A. (1964). A scale for self-assessment of hearing handicap. *Journal for Speech and Hearing Disorders, 29,* 215 – 230.

Hindhede, A. L. (2010). Everyday trajectories of hearing correction. *Health Sociology Review, 3*, 382-394.

Hindhede, A. L. (2011). Negotiating hearing disability and hearing disabled identities. *Health, 16*, 169-185.

Hindley, P., & Kitson, N. (2000). *Mental Health and Deafness.* London: Whurr Publishers.

Hogan, A. (1998). Carving out a space to act – acquired impairment and contested identity. *Health, 2*, 75-90.

Kaiser, A. R., Kirk, K. I., Lachs, L., & Pisoni, D. B. (2003). Talker and lexical effects on audiovisual word recognition by adults with cochlear implants. *Journal of Speech, Language, and Hearing Research, 46*, 390-404.

Kalikow, D. N., Stevens, K. N. & Elliot, L. L. (1977). Development of a test of speech intelligibility in noise using sentence material with controlled word predictability. *Journal of the Acoustical Society of America, 61(5)*, 1337-1351.

Karlson Espmark, A.-K., Rosenhall, U., Erlandson, S., & Steen, B. (2002). The two faces of presbycusis: hearing impairmen and psychosocial consequences. *International Journal of Audiology, 41*, 125-135.

Kelly, G. (1955). *The psychology of personal constructs*. New York: Norton.

Kelly, R. J., Neimeyer, R. A., & Wark, D. J. (2011). Cognitive Anxiety and the decision to seek services for hearing problems. *Journal of Constructivist Psychology, 24*, 168-179.

Kelly-Campbell, R. J. (in press). Outcomes of an Audiologic Rehabilitation Program for Working Adults with Hearing Problems who do not use Amplification. *Journal of the American Academy of Audiology*.

Killion, M. C., Niquette, P., Gudmundsen, G., Revit, L., & Banerjee, S. (2004). Development of a quick speech-in-noise test for measuring signal-to-noise ratio loss in normal-hearing and hearing-impaired listeners. *Journal of the Acoustical Society of America, 116*, 2395-2405.

Kim, S. H., Frisina, R. D., Mapes, F. M., Hickman, E. D., & Frisina, D. R. (2006). Effect of age on binaural speech intelligibility in normal hearing adults. *Speech Communication, 48*, 591-597.

Kochkin, S. (2009). MarkeTrak VIII: 25-year trends in the hearing health market. *Hearing Review, 16*, 12-31.

Kramer, S. E., Allessie, G. H., Dondorp, A. W., Zekveld, A. A. & Kapteyn, T. S. (2005). A home education program for older adults with hearing impairment and their significant others: a randomised trial evaluating short- and long term effects. *International Journal of Audiology, 44,* 255 – 264.

Kübler-Ross, E. (1969). *On death and dying*. New York: Macmillan.

Lalande, N., Lambert, J., & Riverin, L. (1988). Quantification of the psychosocial disadvantages experienced by workers in a noisy industry and their nearest relative perspectives for rehabilitation. *Audiology, 27*, 196-206.

Laplante-Lévesque, A., Hickson, L., & Worrall, L. (2010a). Factors influencing rehabilitation decisions of adults with acquired hearing impairment. *International Journal of Audiology, 49*, 497-507.

Laplante-Lévesque, A., Hickson, L., & Worrall, L. (2010b). Rehabilitation of older adults with hearing impairment: A critical review. *Journal of Aging and Health, 22*, 143-153.

Laplante-Lévesque, A., Knudsen, L. V., Preminger, J. E., Jones, L., Nielsen, C., Öberg, M., …Kramer, S. (2012). Hearing help-seeking and rehabilitation: perspectives of adults with hearing impairment. *International Journal of Audiology, 51*, 93-103.

Leite, W. L., Svinicki, M., & Shi, Y.(2010). Attempted Validation of the Scores of the VARK: Learning Styles Inventory With Multitrait–Multimethod Confirmatory Factor Analysis Models. *Educational and Psychological Measurement, 70(2),* 323 – 339.

Li, E. P.-Y., Li-Tsang, C. W.-P., Lee, T.-K., Lee, G. W.-M., & Lam, E. C.-F. (2006). Vocational rehabilitation program for persons with occupational deafness. *Journal of Occupational Rehabilitation, 16*, 503-512.

Link, B. G., Yang, L. H., Phelan, J. C., & Collins, P. Y. (2004). Measuring mental illness stigma. *Schizophrenia Bulletin, 30*, 511-541.

Livingstone, J. D., Milne, T., Fang, M. L., & Amari, E. (2011). The effectiveness of intervention for reducing stigma related to substance use disorders: a systematic review. *Addiction, 107*, 39-50.

Livneh, H., & Antonak, R. E. (1997). *Psychosocial adaptation to chronic illness and disability*. Gaithersburg, MD: Aspen.

Maggi, S., Minicuci, N., Martini, A., Langlois, J., Siviero, P., Pavan, M., & Enzi, G. (1998). Prevalence rates of hearing impairment and comorbid conditions in older people: the Veneto study. *Journal of the American Geriatric Society, 46*, 1069-1074.

Major, B., & O'Brien, L. T. (2005). The social psychology of stigma. *Annual Review of Psychology, 56*, 393-421.

Malinoff, R., & Weinstein, B. (1989). Measurement of hearing aid benefit in the elderly. *Ear and Hearing, 10*, 354-356.

McArdle, R., & Chisholm, T. (2009). Speech Audiometry. In J. Katz, L. Medwetsky, R. Burkhard & L. Hood (Eds.), *Handbook of Clinical Audiology*(6th ed., pp 64 - 79). Philadelphia: Lippincott Williams & Wilkins.

Meyer, C., Hickson, L., Khan, A., Hartley, D., Dillon, H., & Seymour, J. (2011). Investigation of the actions taken by adults who failed a telephone-based hearing screen. *Ear and Hearing, 32*, 720-731.

Montori, V. M., Gafni, A., & Charles, C. (2006). A shared treatment decision-making approach between patients with chronic conditions and their clinicians: the case of diabetes. *Health Expectations, 9*, 25-36.

Monzani, D., Genovese, E., Palma, S., Rovatti, V., Borgonzoni, M., & Martini, A. (2007). Measuring the psychosocial consequences of hearing loss in a working adult population: focus on validity and reliability of the Italian translation of the Hearing Handicap Inventory. *Acta Otorhinolaryngolica Italiana, 27*, 186-191.

New Zealand Audiological Society. (2007a). Speech Testing in School Aged Children and Adults Retrieved January 9, 2013, from http://www.audiology.org.nz/Userfiles/file/_private/Speech%20testing.pdf

New Zealand Audiological Society. (2007b). Standard Adult Immittance Audiometry Retrieved January 9, 2013, from http://www.audiology.org.nz/UserFiles/file/_private/immittance.pdf

New Zealand Audiological Society. (2008). Standard Audiological Assessment Retrieved January 9, 2013, from http://www.audiology.org.nz/userfiles/file/pdf/Std%20Audio%20Assment.pdf

New Zealand Audiological Society. (2012a). Adult Puretone Audiometry Retrieved January 9, 2013, from http://www.audiology.org.nz/UserFiles/file/_private/adult%203.pdf

New Zealand Audiological Society. (2012b). Hearing Aid Protocol. Preferred Fitting Guideline Retrieved January 9, 2013, from http://www.audiology.org.nz/Userfiles/file/_private/Adult%20Hearing%20Aids%20PPG.pdf

Newman, C. W., Jacobsen, G., Hug, G., A., Weinstein, B., & Malinoff, R. (1991). Practical method for quantifying hearing aid benefit in older adults. *Journal of the American Academy of Audiology, 2*, 70-75.

Newman, C. W., & Sandrige, S. (1998). Benefit from, satisfaction with, and cost-effectiveness of three different hearing aid technologies. *American Journal of Audiology, 7*, 115-128.

Newman, C. W., Weinstein, B., Jacobsen, G., & Hug, G., A. (1991). Test-Retest Reliability of the Hearing Handicap Inventory for Adults. *Ear and Hearing, 12*, 355-357.

Newman, C. W., Weinstein, B. E., Jacobson, G. P., & Hug, G., A. (1990). The Hearing Handicap Inventory for Adults: Psychometric adequacy and audiological correlates. *Ear and Hearing, 11*, 430-433.

Noble, W. (2002). Extending the IOI to significant others and to non-hearing-aid-based interventions. *International Journal of Audiology, 41*, 27-29.

Oishi, N., Shinden, S., Kanzaki, S., Saito, H., Inoue, Y. & Ogawa, K. (2011), Influence of depressive symptoms, state anxiety, and pure-tone thresholds on the tinnitus handicap inventory in Japan. *International Journal of Audiology (50),* 491 – 495.

Ormel, J., Kempen, G. I., Pennix, B. W., Brilman, E. I., Beekman, A. T., & van Sonderen, E. (1997). Chronic medical conditions and mental health in older people: disability and psychosocial resources mediate specific mental health effects. *Psychosocial Medicine, 27*, 1065-1077.

Pichney, M. A., Durlach, N., & Braida, L. D. (1985). Speaking clearly for the hard of hearing I: Intelligibility differences between clear and conversational speech. *Journal of Speech and Hearing Research, 28*, 96-103.

Portney, L. G. & Watkins, M. P. (2009). *Foundations of clinical research: Applications to practice.* Upper Saddle River, Pearson/Prentice Hall.

Preminger, J. E. (2003). Should significant others be encouraged to join adult group audiologic rehabilitation classes? *Journal of the American Academy of Audiology, 14*, 545-555.

Preminger, J. E. (2007). Issues associated with the measurement of psychosocial benefits of group audiologic rehabilitation programs. *Trends in Amplification, 11*, 113-123.

Preminger, J. E., & Yoo, J. K. (2010). Do group audiologic rehabilitation activities influence psychosocial outcomes? *American Journal of Audiology, 19*, 109-125.

Prendergast, S. G., & Kelley, L. A. (2002). Aural rehab services: survey reports who offers which ones and how often. *Hearing Journal, 55*, 30-35.

Primeau, R. (1997). Hearing aid benefit in adults and older adults. *Seminars in Hearing, 18*, 30-36.

Purdy, S., Arlington, B., & Johnstone, C. (2000). Normative Data for the New Zealand Recording of the CVC (Revised AB) Word Lists. *New Zealand Audiological Society Bulletin, 10*(2), 20-29.

Radcliffe, D. (1998). The high cost of hearing loss: what our publics need to know. *Hearing Journal, 51*, 21-30.

Resnick, H. E., Fries, B. E., & Verbrugge, L. M. (1997). Windows to their world: the effect of sensory impairments on social engagement and activity time in nursing home residents. *Journal of Gerontologic Series B Psychosocial Sciences and Social Sciences, 52*, S135-S144.

Roberto, K. A., & McCann, B. R. (2011). Everyday health and identity management among older women with chronic health conditions. *Journal of Aging Studies, 25*, 94-100.

Ruben, J. R. (2000). Redefining the survival of the fittest: communication disorders in the 21st century. *Laryngoscope, 110*, 241-245.

Rydberg, E., Coniavitis Gellerstedt, L., & Danermark, B. (2010). The positin of the Deaf in the Swedish Labour Market. *American Annals of the Deaf, 155*, 68-77.

Saunders, G. H. & Cienkowski, K .M. (1996). Refinement and psychometric evaluation of the attitudes towards loss of hearing questionnaire. *Ear and Hearing, 17,* 505 – 517.

Scambler, G. (2009). Health-related stigma. *Sociology of Health & Illness, 31*, 441-455.

Schiavetti, N. & Metz, D.E. (2002). *Evaluating research in communication disorders*. Boston: Allyn & Bacon.

Schlauch, R. S. & Nelson, P. (2009). Puretone Evaluation. In J. Katz, L. Medwetsky, R. Burkhard,& L. Hood. (Eds.) *Handbook of Clinical Audiology* (6th ed., pp 30 - 49). Philadelphia: Lippincott Williams & Wilkins.

Schneider, R. (1997). *Vom Umgang mit Zahlen und Daten*. Frankfurt am Main: Umschau Zeitschriftenverlag

Schulz, K. F., Chalmers. I., Hayes, R. J. & Altman, D. G. (1995). Empirical evidence of bias. Dimensions of methodological quality associated with estimates of treatment effects in controlled trials. *Journal of the American Medical Association (273)*, 408–412.

Shadish, W. R., Cook, T. D., Campbell, D. T. (2002). *Experimental and Quasi-Experimental Designs for Generalized Causal Inference* (2nd ed.). New York: Cengage Learning.

Shanks, J., & Shohet, J. (2009). Tympanometry in Clinical Practice. In J. Katz, L. Medwetsky, R. Burkhard & L. Hood (Eds.), *Handbook of Clinical Audiology* (6th ed., pp 157 - 188). Philadelphia: Lippincott Williams & Wilkins.

Silva Francelin, M., Genaro Motti, T., & Morita, I. (2010). Social implications of acquired hearing impairment in adults. *Saude Society, 19*, 180-192.

Southall, K., Gagné, J.-P., & Jennings, M. (2010). Stigma: a negative and a positive influence on help-seeking for adults with acquired hearing loss. *International Journal of Audiology, 49*, 804-814.

Southall, K., Gagné, J.-P. and Leroux, T. (2006). Factors that influence the use of assistance technologies by older adults who have a hearing loss. *International Journal of Audiology, 45,* 252 – 259.

Southall, K., Jennings, M., & Gagné, J.-P. (2009). The application of stigma-induced identity threat to individuals with hearing loss. *Journal of the Academy of Rehabilitative Audiology, 40*, 11-17.

Spielberger, C. D., Gorsuch, R. L., & Lushere, R. E. (1971). *State-Trait Anxiety Inventory*. Palo Alto, California: Consulting Psychologists Press.

Stark, P., & Hickson, L. (2004). Outcomes of hearing aid fitting for older people with hearing impairment and their significant others. *International Journal of Audiology, 43*, 390-398.

Statistics New Zealand. (2008a). Census data 2006 Retrieved January 9, 2013, from http://www.stats.govt.nz/Census/2006CensusHomePage.aspx

Statistics New Zealand. (2008b). Disability and the Labour Market in New Zealand in 2006 Retrieved January 9, 2013, from http://www.stats.govt.nz/browse_for_stats/health/disabilities/disability-and-the-labour-market-in-nz-2006.aspx

Stephens, D. (2006). Deafness and its treatment in ancient civilisations. *Audiological Medicine, 4*, 85-93.

Stumer, J., Hickson, L., & Worrall, L. (1996). Hearing impairment, disability, and handicap in elderly people living in residential care and in community. *Disability and Rehabilitation, 18*, 76-82.

Sweetow, R., & Henderson-Sabes, J. (2006). The need for and development of an adaptive listening and communication enhancement (LACE^{TM}) program. *Journal of the American Academy of Audiology, 17*, 538-558.

Sweetow, R., & Palmer, C. (2005). Efficacy of individual auditory training in adults: A systematic review of the evidence. *Journal of the American Academy of Audiology, 16*, 495-504.

Tambs, K. (2004). Moderate effects of hearing loss on mental health and subjective well-being: Results from the Nord-Trøndlag Hearing Loss Study. *Psychosomatic Medicine, 66*, 776-782.

Thibodeau, L. (2009). Hearing assistance listening technology systems as part of a comprehensive audiologic rehabilitation program. In J. J. Montano & J. B. Spitzer (Eds.), *Adult Audiologic Rehabilitation* (pp. 305-328). San Diego: Plural Publishing.

Thorndike, E. L. (1920). A constant error on psychological rating. *Journal of Applied Psychology, IV*, 25–29.

Thorne, S., Paterson, B., & Russel, C. (2003). The structure of everyday self-care decision making in chronic illness. *Qualitative Health Research, 13*, 1337-1352.

Tomita, M., Mann, W. C., & Welch, T. R. (2001). Use of assistive devices to address hearing impairment by older persons with disabilities. *International Journal of Rehabilitation Research, 24*, 279-289.

Tye-Murray, N. (2009). *Foundations of Aural Rehabilitation. Children, Adults and Their Family Members* (3rd ed.). Clifton Park, NY: Delmar Cengage Learning.

Uchanski, R., Choi, S. S., Sunkyung, S., Braida, L. D., Reed, C. M., & Durlach, N. I. (1996). Speaking clearly for the hard of hearing IV: Further studies of the role of speaking rate. *Journal of Speech and Hearing Research, 39*, 494-509.

van der Ven, N. (2003). Psychosocial group interventions in diabetes care. *Diabetes Spectrum, 16*, 88-95.

Ventry, I., & Weinstein, B. (1982). The Hearing Handicap Inventory for the Elderly: A new tool. *Ear and Hearing, 3*, 128-134.

Viney, L. (1983). The assessment ofpsychosocial states through the content analysis of verbal communications. *Psychosocial Bulletin, 94,* 542 - 563

Viney, L., & Westbrook, M. (1976). Cognitive anxiety: A method of content analysis for verbal samples. *Journal of Personality Assessment, 40*, 140-150.

Wallhagen, M. I. (2009). The stigma of hearing loss. *The Gerontologist, 50*, 66-75.

Ward, J., & Winstanley, D. (2005). Coming out at work: Performativity and the recognition and renegotiating of identity. *The Sociological Review, 53*, 447-475.

Ware, J. J., & Sherbourne, C. D. (1992). The MOS 36-item short form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care, 30*, 473-483.

Weinstein, B., & Ventry, I. (1982). Hearing impairment and social isolation in the elderly. . *Journal of Speech and Hearing Research, 25*, 593-599.

Winn, S. (2007). Employment outcomes for people in Australia who are congenitally deaf: Has anything changed? . *American Annals of the Deaf, 152*, 382-390.

World Health Organization. (2001). Fact sheet Number 352 Disability and health Retrieved February 9, 2013, from http://www.who.int/mediacentre/factsheets/fs352/en/index.html

Yacullo, W. (2009). Clinical Masking. In J. Katz, L. Medwetsky, R. Burkhard & L. Hood (Eds.), *Handbook of Clinical Audiology* (6th ed., pp 80 -115). Philadelphia: Lippincott, Williams & Wilkins.

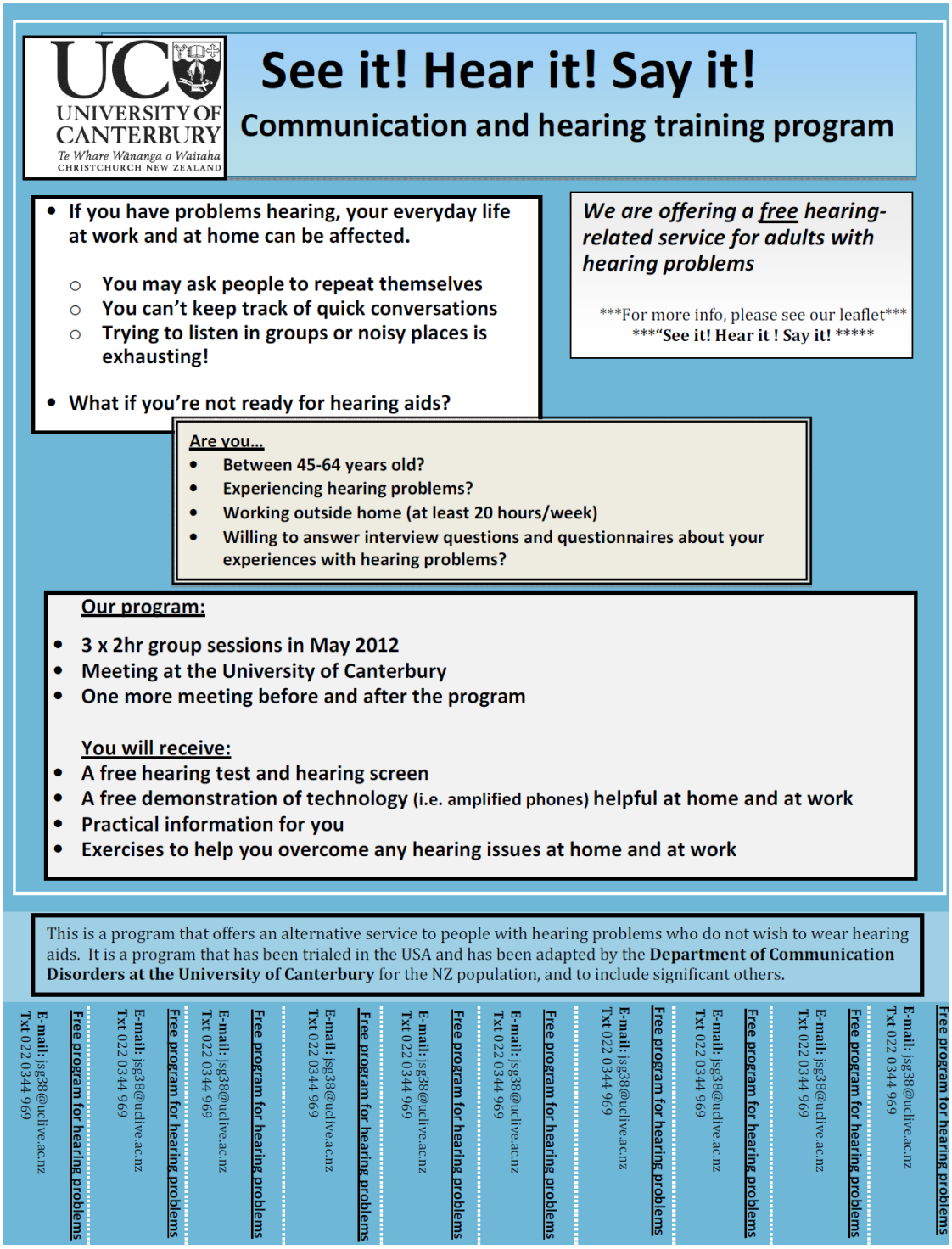
Yucel, E. & Sennaroglu, G (2007). Is psychological status a determinant of speech perception outcomes in highly selected good adolescent cochlear implant users? *International Journal of Pediatric Otorhinolaryngology (9)*, 1415 - 1422

Zachariae, R., Mirz, F., Johansen, L.V., Andersen, S.E., Bjerring, P. & Pedersen C.B. (2000). Reliability and validity of a Danish adaptation of the Tinnitus Handicap Inventory. *Scandinavian Journal of Audiology (1)*, 37 – 43

6. APPENDICES

6.1. Appendix 1: recruitment advertising

6.1.1 Advertising flyer



6.1.2 Folded brochure for advertising

See it! Hear it! Say it!

Why communication and hearing training?

This is an alternative approach to managing hearing problems that does not involve using hearing aids.

When someone has a hearing loss, their day to day lives can be affected:

- Communication can get difficult at home or at work.
- It might be hard to keep track of conversations or
- You might be asking for repetitions more than usual.

In the communication and hearing training programme, we will explore how to overcome these issues for you, and how to make the best of the hearing that you have got.

Who is it for?

- People who feel that they are not ready for hearing aids
- Working adults: employed outside the home (at least 20 hours per week)
-
- Aged 45—64 years
- Problems hearing in day to day situations at work and at home
- No previous treatment for hearing problems (i.e. hearing aids etc.)

When and how?

- May to July 2012
- 3 evening group sessions (approx. 2 hours)
- Meet at University of Canterbury
- 1 individual meeting before group starts
- 1 evaluation meeting after group finishes

Scientific Basis

This is part of a research project based on a programme from the USA

We are adjusting it for the New Zealand population.

The data we gather will be scientifically evaluated to improve the programme.

6.2 Appendix 2: invitation e-mail for potential candidates

6.2.1 Invitation e-mail: text body

Dear…,

Thank you for your interest in our communication programme. I will explain some details in this e-mail, when and where the meetings are held and which steps we have to take for the scientific evaluation. I have also attached our little brochure for your information.

We are running 2 groups, the first group started on 17.5., the other will start on 12.7. You will be randomly assigned to one group if at all possible; this is necessary to check that improvements in your communication are caused by no other factor than our programme! Both are Thursdays, and the group will start at 6.30pm.

Before we can assign you to a group, we would like to test your hearing. We will do this at university (I will send detailed instructions where to go). At this time, we will also give you some questionnaires and a 5 minute interview for the scientific evaluation. All in all, it should not take longer than one hour. We can arrange that it the next week. I have some lectures to attend, but otherwise I can work around you, whenever it suits you. If you want to give me maybe 3 options, then I am sure, we can come to an agreement.

We will also need a formal consent from you. I have attached the consent form for this. Would you mind bringing that to the hearing test? Please find also attached an information letter about this study. This is for you to keep and hopefully explains the all details about the formalities. Please feel free to ask if you have any further questions.

Last, but not least, please double check if you fulfil all the inclusion criteria for this study. I'd hate to ask for your time, just to stumble over this administrative hurdle. We will check number 5 with the hearing test. If you have had a hearing test before and still got a copy of the results, please bring it along with you.

Inclusion criteria:

(1) 45 – 64 years of age

(2) be self-identified as having communication problems due to hearing loss

(3) employed outside your home, at least 20 hours

(4) have no previous experience with hearing aids or assistive listening devices

(5) have a four frequency puretone average (4-PTA) at the frequencies 0.5, 1.0, 2.0 and 4.0 kHz of 16 – 55 dB HL in at least on ear.

(6) no recent sudden hearing impairment

(7) no tinnitus sufferers, who assess themselves as moderately to severely affected by tinnitus, if their primary interest is in improving the tinnitus

Last, but not least, we still would love to have some more people to join. Please feel free to pass on the information in your networks.

Warm regards,

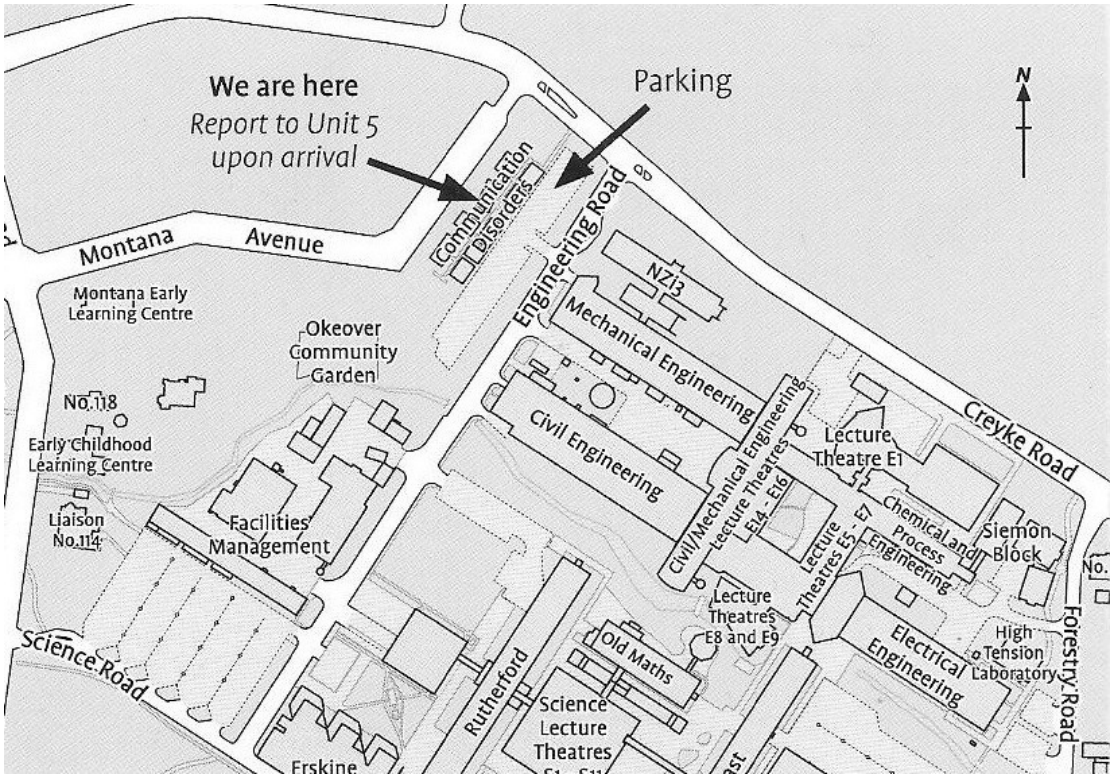
Jessica Grosskreutz

Master of Audiology Student
Department of Communication Disorders
University of Canterbury
New Zealand

6.2.2 Attachment 1 to invitation e-mail: advertising material

See folding brochure in appendix 1

6.2.3 Attachment 2 to invitation e-mail: Map of location of University of Canterbury Speech and Hearing Clinic



6.2.4 Attachment 3 to invitation e-mail: Information letter

Researchers: Jessica Grosskreutz, Dr. Rebecca Kelly-Campbell

University of Canterbury
Department of Communication Disorders
Private Bag 4800
Christchurch 8140
New Zealand

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Information for participants

You are invited to participate as a subject in the research project **"Outcome of an audiologic rehabilitation programme for working adults with hearing loss who do not wear amplification"** The aim of the this project is to develop a new hearing-related service for working adults who have hearing problems but do not wish to use hearing aids. The project will examine the usefulness of a communication training programme called "Hear It! See It! Say It!" that has been adapted for a New Zealand population.

The participants will be divided randomly in two groups. One group will start their communication training immediately; the other, so called 'waitlist group' will commence their training after a period of 6 weeks.

Your involvement in this project will be

1. An individual recruitment meeting (appr. 1 hour) consisting of:
   a) A comprehensive hearing assessment
   b) Filling out 2 questionnaires about your experience with hearing loss
   c) A short interview (recorded) about your experience with hearing loss

2. For the 'waitlist' group: filling in the questionnaires and participating in the interview again after the waitlist period, before commencing the training programme.

3. A communication training programme in three evenings at 2 hours each

4. After the completion of the programme, filling out the same questionnaires and participating in another short interview that will be recorded (appr. 30 minutes)

5. A group meeting appr. 12 weeks after the finish of the programme for evaluation of the programme (appr. 1 hour)

6. Filling out an anonymous online questionnaire, giving feedback about the programme and the facilitators (appr. 10 minutes)

As this programme is still in the research stage, no enhanced communication can be promised as a result of the participation.

Potential Risk:

In the interviews, you will be asked to talk about your experience living with hearing impairment; the one risk of participating in this study is the possibility of feelings of distress as you discuss your experiences. The interviews will be recorded and you will be able to view the transcript after the researcher has transcribed it.

Your Rights:

You have the right to withdraw from the project at any time, including withdrawal of any information you have provided. Withdrawal from participation in this study is without

penalty and will in no manner affect any ongoing or future relationships with the University of Canterbury or your hearing aid clinic.

Confidentiality:

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: the identity of participants will not be made public without their consent. To ensure anonymity and confidentiality, your name will not be used on your data files; instead you will be given a participant number. In addition, the consent form will be kept in a locked cabinet in a locked room in the Department of Communication Disorders on the University of Canterbury campus in Christchurch, New Zealand. Electronic data (without your identifying information) will be kept on password-protected computers that are stored in a locked room in the Department of Communication Disorders on the University of Canterbury campus in Christchurch, New Zealand. The raw data will be destroyed after five years.

Researchers:

The project is being carried out as a requirement for a Masters of Audiology by Jessica Grosskreutz under the supervision of **Dr. Rebecca Kelly-Campbell**, who can be contacted at **rebecca.kelly@canterbury.ac.nz** or **phone (03) 364-2987 ext. 8327**. She will be pleased to discuss any concerns you may have about participation in the project.

The project has been reviewed and approved by the University of Canterbury Human Ethics Committee.

6.2.5 Attachment 4 to invitation e-mail: Consent form

Researchers: Jessica Grosskreutz, Rebecca Kelly-Campbell

Contact address: University of Canterbury
Department of Communication Disorders
Private Bag 4800
Christchurch 8140
New Zealand

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Date: _____

Consent Form

"Outcome of an audiologic rehabilitation programme for working adults with hearing loss who do not wear amplification

I have read and understood the description of the above-named project. On this basis, I agree to participate as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved.

I consent to be interviewed about my experiences with hearing loss and that this interview is audio recorded.

I consent to treat all issues discussed in the group sessions in a confidential manner.

I understand also that I may at any time withdraw from the project, including withdrawal of any information I have provided.

I note that the project has been reviewed ***and approved*** by the University of Canterbury Human Ethics Committee.

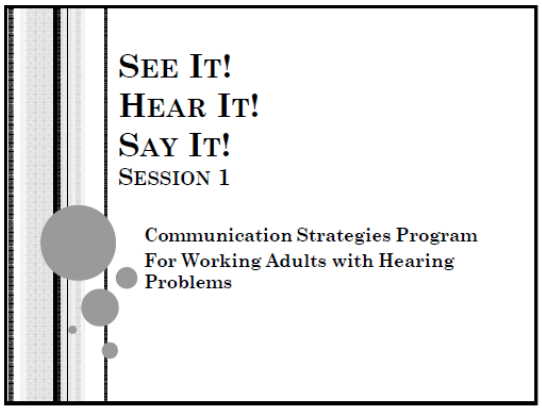
Name: (please print): _____

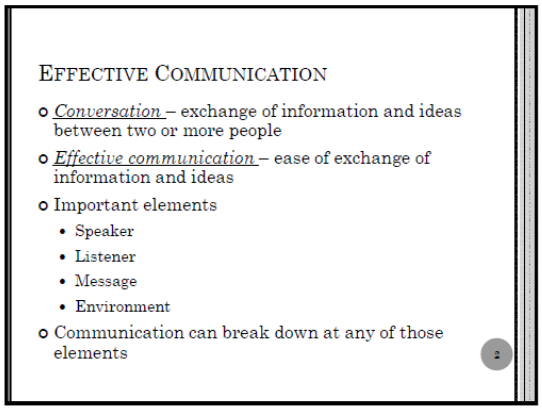
Signature: _____

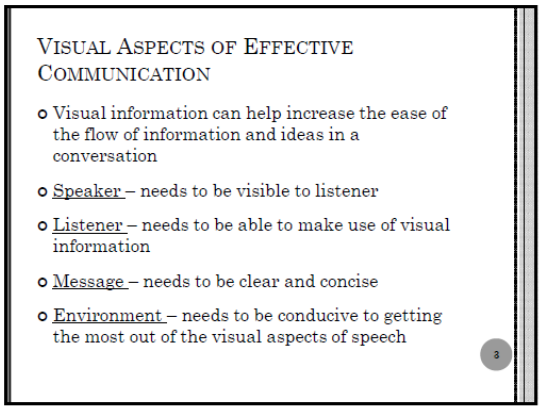
Date: _____

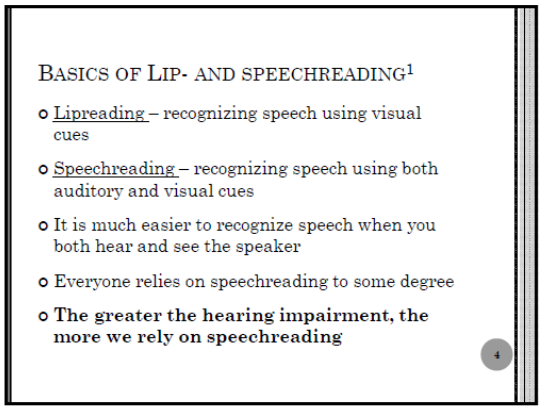
6.3 Appendix 3: Slides used in audiologic rehabilitation programme

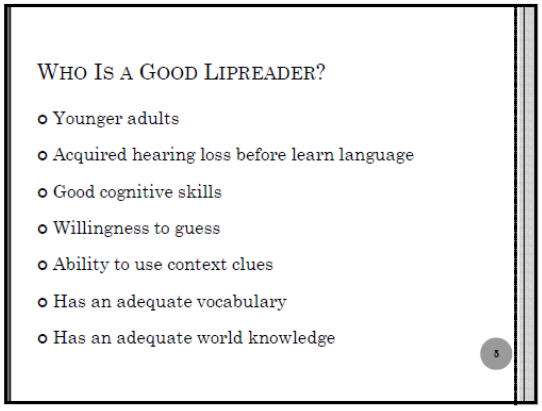
6.3.1 Session 1

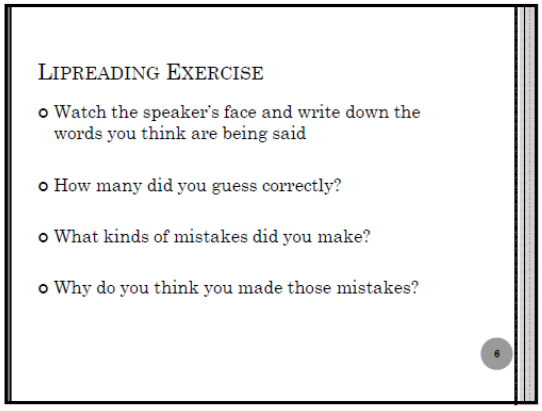












WHY IS LIPREADING DIFFICULT?

- Many sounds of English are not visible on the lips
- People speak quickly – faster than your eye can recognize the sound
- Sounds are affected by the other sounds in the same word
- Many sounds of English look alike on the face
- Many sounds of English look different when different people say them

7

ADDING VISUAL AND AUDITORY INFORMATION

- We don't know how we do it – but we are able to add what we see and what we hear to help us understand
- What we see affects what we hear – and vice versa
- *Clear Speech*[2,3] – speaking in a way that helps the listener understand what's being said
  - Speaking somewhat slower
  - Good enunciation – but not over exaggerated

8

SPEECHREADING EXERCISE 1

- Watch the speaker's face and listen to the words. Write down what you think is being said.
- How did you do with this exercise compared to the last one?
- What kind of mistakes did you make?
- What would have helped you perform better?

9

WHAT HELPS SPEECHREADING?

1. Talker

- Being familiar with the speaker[4]
- females are easier to lipread, but speak in a higher pitch; no facial hair to obscure view[5,6]

2. Message

- Shorter, simpler sentences[1]
- Using common words[1]
- Using context clues[7]

10

WHAT HELPS SPEECHREADING?

3. Environment

- Being in front of speaker, or at least within a 45° angle[8]
- Being closer to the speaker (about 1.8 meters)[9]
- Having adequate lighting with no shadows on speaker's face[9]

4. Speech reader

- Reducing fatigue and stress[1]

11

SPEECHREADING EXERCISE 2

- Watch the speaker's face and listen to the words. Write down what you think is being said.
- Make any adjustments you can to improve your understanding of what is being said.
- How did you do with this exercise compared to the others?
- What did you find difficult?
- What did you find helpful?

12

BREAK

13

CRITICAL EVALUATION OF YOUR WORKSPACE

- Think about the problems you have at work
- What do you think contributes to difficulties with speechreading in those situations?
- What can you do to improve your speechreading abilities in those situations?

14

CHANGES YOU WOULD LIKE TO MAKE

- What specific changes could you make at work to improve your speechreading abilities?
  - Your attributes
  - Speaker attributes
  - Environment attributes
  - Message attributes
- Try making some of these changes and report back to the group next session

15

CHALLENGES FOR THE WEEK

16

6.3.2 Session 2

See It! Hear It! Say It!
Session 2

Communication Strategies Program
For Working Adults with Hearing Problems

Auditory Aspects of Effective Communication

Auditory information can help increase the ease of the flow of information and ideas in a conversation

1. Speaker: needs to be audible to listener

2. Listener: needs to be able to make use of auditory information

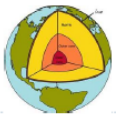
3. Message: needs to be clear and concise

4. Environment: needs to be conducive to getting the most out of the auditory aspects of speech

2

Distance Affects Audibility

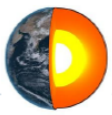
- The further away the speaker is from the listener, the softer the speech will be when it reaches the listener
  - Sound travels in a spherical shape away from the speaker
  - The energy in the sound is spread over a greater area
  - There is less energy available as the listener is farther away from the speaker



3

Distance Affects Audibility

- You will be able to *hear* the speech at softer levels than you will need to *understand* it
- Everyone has difficulty hearing and understanding speech if it is very soft
- **The greater the hearing impairment, the closer we need to be to the speaker to hear and understand speech**



4

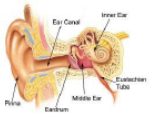
Signal to Noise Ratio

- It is easier to listen to a signal that is a certain amount louder than the background noise
- The louder the signal, the easier the listening (=effective communication)
- If noise sources are at least 90 degree removed from signal, listening gets easier (=effective communication)

5

Types of Hearing Impairment

- Conductive
  - Problem is in the outer or middle ear
  - Is often medically treatable



- Sensorineural
  - Problem is in the organ of hearing or the nerve of hearing
  - Almost never medically treatable
- Mixed
  - More than one problem
  - One in the sensorineural portion and one in the conductive portion

6

Problems Resulting from Sensorineural Hearing Impairment

- Cannot *hear* what is being said
  - Soft sounds become inaudible
- Cannot *understand* what is being said
  - Speech is becomes unclear and distorted
- Background noise is a problem
  - Makes speech even more distorted
  - Makes listener tired and distracted
- Hearing aids are designed to address the first problem
  - **Do not** address problems with listener's ability to understand what is being said or difficulty understanding in background noise
  - Even with hearing aids, people need to use communication strategies

7

Shape of Hearing Impairment

"I know you're talking, but I don't know what you're saying"

- When there is little hearing impairment in the lower pitches (or normal hearing), you can hear that people are talking
- When there is more hearing impairment in the higher frequencies, you have difficulty understanding what people are saying
- More common for people with sensorineural hearing impairment

8

Language Redundancies and Context Clues

People with sensorineural hearing impairment do not need to hear every speech sound to understand speech

- **Language markers (e.g., number marker -s)**
  - Tend to be soft and higher in pitch
  - If the noun is singular (e.g., man), you do not need to hear the number marker on the verb (e.g., eats)
- **Grammatical rules (e.g., sentence order)**
  - If you hear book … on … table, you do not need to hear other words to understand sentence
- **Context clues**
  - If you know the context of the conversation, you can guess what some of the words will be

9

Language Redundancies and Context Clues Exercise

- Watch the speaker's face and listen to the words. Write down what you think is being said.
- What clues did you use to fill in the missing words?
- Which examples were easier?
- Why do you think they were easier?

10

Assistive Listening Devices

- Hearing Assistance Technology Systems (HATS)
- Used to help people with hearing problems receive speech and non-speech information[10]
- Can be used for a large group or for an individual
  - Public address (PA) systems
  - Headphones
  - Amplified telephones
- Can be used with or without hearing aids
- Health and safety concerns if cannot hear alarms

11

Common Assistive Listening Devices

- Telephone
  - Amplified phone ($101 – 325), amplified ringer ($21-150), visual voice mail, speech to text software, relay service
  - Texting and emailing when possible
- Groups
  - Conference microphone (less efficient as group size increases), pa system (less efficient as group size decreases), FM system ($270 – 400)
  - Note-taker, recording for later listening
- Background noise
  - FM system, pa system, TV headphones ($275 – 390)
- Audio-visual material
  - Infra-red system, closed captioning

12

Coffee Break

13

Critical Evaluation of Your Workspace

- Think about the problems you have at work
- What contributes to difficulties hearing and understanding in those situations?
- What can you do to improve your hearing and understanding in those situations?

14

Changes You Would Like to Make

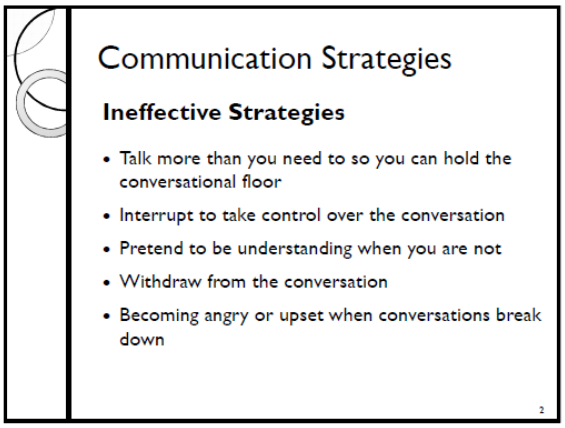
- What specific changes could you make to at work to improve your hearing and understanding?
  - Your attributes
  - Speaker attributes
  - Environment attributes
  - Message attributes
- Try to make some of these changes and report back to the group next session

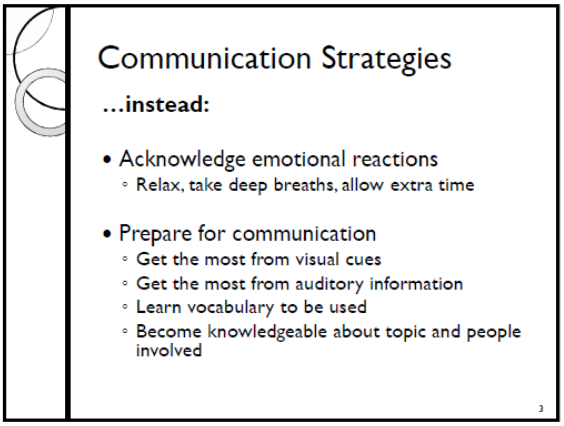
15

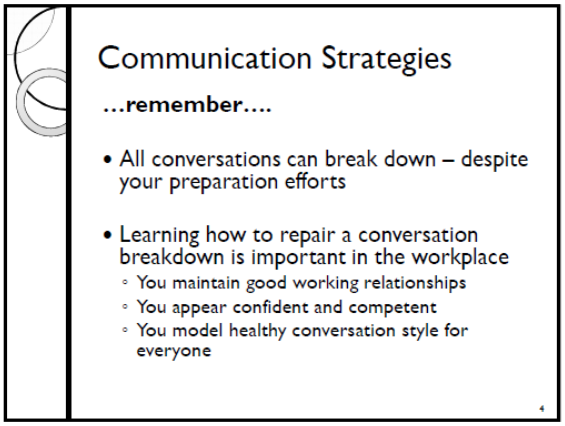
Challenges for the week

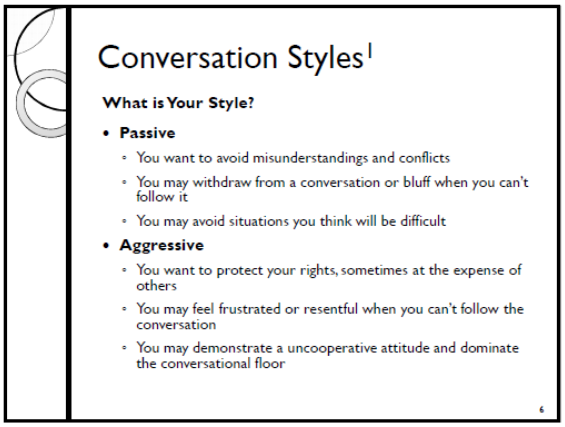
16

6.3.3 Session 3









Conversation styles[1]

- **Passive-Aggressive**
  - You may use a passive style at first, then move to an aggressive style as you become more frustrated
  - You may use sarcasm and procrastination
- **Assertive**
  - You take responsibility for effective communication in a collegial way
  - You openly discuss your communication problems and tell others how best to communicate with you
  - You model effective communication and acknowledge the efforts made by others

7

Coffee Break

8

Your Worker Rights

1. New Zealand Bill of Rights Act 1990 and Human Rights Act 1993

- Protected from discrimination
- No one can be treated differently
- 'reasonable accommodation' for employee's needs, esp. health and safety → employers should genuinely attempt to accommodate their employees
- Not required to spend money by law, no 'unreasonable disruption'

2. Employment Relations Act 2000

- Equal pay and equal rights
- Equal opportunities in hiring, firing, training and promotion

9

Critical Evaluation of Your Workspace

- Think about the problems you have at work
- What contributes to communication breakdowns in those situations?
- What can you do to reduce communication breakdowns or repair them when they occur?
- What worker rights do you have that you are not taking advantage of?

10

Changes You Would Like to Make

- What specific changes could you make to at work to reduce communication breakdowns or improve outcomes of repairs?
  - Your attributes
  - Speaker attributes
  - Environment attributes
- What worker rights are available to you that you would like to implement at work?

11

My challenges for the week

_____

_____

_____

_____

_____

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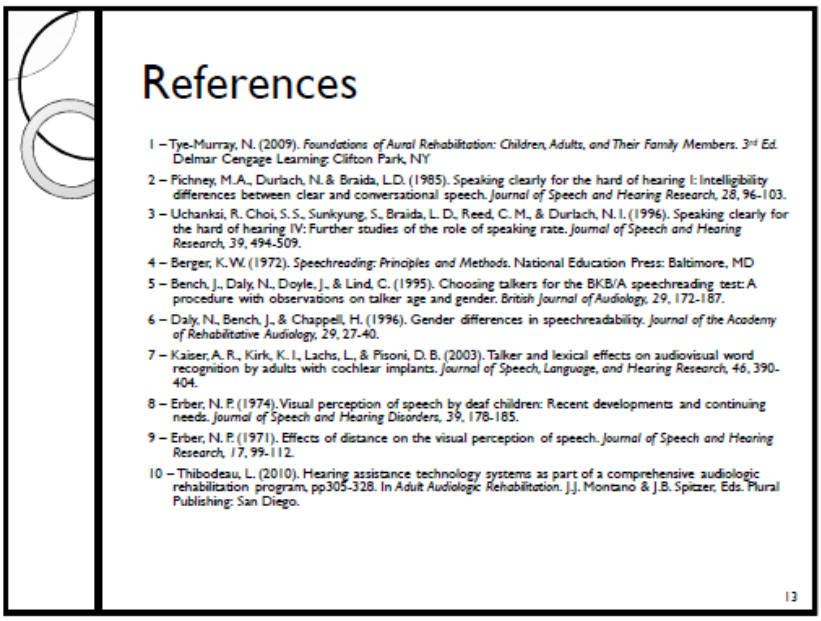

References

1 – Tye-Murray, N. (2009). *Foundations of Aural Rehabilitation: Children, Adults, and Their Family Members. 3rd Ed.* Delmar Cengage Learning: Clifton Park, NY

2 – Pichney, M.A., Durlach, N. & Braida, L.D. (1985). Speaking clearly for the hard of hearing I: Intelligibility differences between clear and conversational speech. *Journal of Speech and Hearing Research, 28*, 96-103.

3 – Uchanksi, R. Choi, S. S., Sunkyung, S., Braida, L. D., Reed, C. M., & Durlach, N. I. (1996). Speaking clearly for the hard of hearing IV: Further studies of the role of speaking rate. *Journal of Speech and Hearing Research, 39*, 494-509.

4 – Berger, K.W. (1972). *Speechreading: Principles and Methods*. National Education Press: Baltimore, MD

5 – Bench, J., Daly, N., Doyle, J., & Lind, C. (1995). Choosing talkers for the BKB/A speechreading test: A procedure with observations on talker age and gender. *British Journal of Audiology, 29*, 172-187.

6 – Daly, N., Bench, J., & Chappell, H. (1996). Gender differences in speechreadability. *Journal of the Academy of Rehabilitative Audiology, 29*, 27-40.

7 – Kaiser, A. R., Kirk, K. I., Lachs, L., & Pisoni, D. B. (2003). Talker and lexical effects on audiovisual word recognition by adults with cochlear implants. *Journal of Speech, Language, and Hearing Research, 46*, 390-404.

8 – Erber, N. P. (1974). Visual perception of speech by deaf children: Recent developments and continuing needs. *Journal of Speech and Hearing Disorders, 39*, 178-185.

9 – Erber, N. P. (1971). Effects of distance on the visual perception of speech. *Journal of Speech and Hearing Research, 17*, 99-112.

10 – Thibodeau, L. (2010). Hearing assistance technology systems as part of a comprehensive audiologic rehabilitation program, pp305-328. In *Adult Audiologic Rehabilitation*. J.J. Montano & J.B. Spitzer, Eds. Plural Publishing: San Diego.

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6.4 Appendix 4: International Outcome Inventory – Alternative Outcomes

International Outcome Inventory - Alternative Interventions

Participant Number _____

1. Think about how much you used communication strategies over the past 2 weeks. On an average day, how many hours did you use them?	☐ None	☐ less than 1 hour per day	☐ 1-4 hours per day	☐ 4 - 8 hours per day	☐ More than 8 hours per day
2. Think about the situation where you most wanted to hear better, before training on communication strategies. Over the past 2 weeks, how much have communication strategies helped in that situation?	☐ Helped not at all	☐ Helped slightly	☐ Helped moderately	☐ Helped quite a lot	☐ Helped very much
3. Think again about the situations where you most wanted to hear better. When you use communication strategies, how much difficulty do you STILL have in that situation?	☐ Very much difficulty	☐ Quite a lot of difficulty	☐ Moderate difficulty	☐ Slight difficulty	☐ No difficulty
4. Considering everything, do you think using communication strategies is worth the trouble?	☐ Not at all worth	☐ Slightly worth it	☐ Slightly worth it	☐ Quite a lot worth it	☐ Very much worth it
5. Over the past 2 weeks, using communication strategies, how much have your hearing difficulties affected the things you can do?	☐ Affected very much	☐ Affect quite a lot	☐ Affected moderately	☐ Affected slightly	☐ Affected not at all
6. Over the past 2 weeks, using communication strategies, how much were other people bothered by you hearing difficulties?	☐ Bothered very much	☐ Bothered quite a lot	☐ Bothered moderately	☐ Bothered slightly	☐ Bothered not at all
7. Considering everything, how much has using communication strategies changed your enjoyment of life?	☐ Worse	☐ No change	☐ Slightly better	☐ Quite a bit better	☐ Very much better

6.5 Appendix 5: Hearing Handicap Inventory for Adults

Hearing Handicap Inventory for Adults

Participant Number _____

Instructions: The purpose of the scale is to identify the problems your hearing loss may be causing you. Check Yes, Sometimes or No for each question. Do not skip a question if you avoid a situation because of your hearing loss.

S-1	Does a hearing problem cause you to use the phone less often than you would like?	☐ Yes	☐ Sometimes	☐ No
E-2	Does a hearing problem cause you to feel embarrassed when meeting new people?	☐ Yes	☐ Sometimes	☐ No
S-3	Does a hearing problem cause you to avoid groups of people?	☐ Yes	☐ Sometimes	☐ No
E-4	Does a hearing problem make you irritable?	☐ Yes	☐ Sometimes	☐ No
E-5	Does a hearing problem cause you to feel frustrated when talking to members of your family?	☐ Yes	☐ Sometimes	☐ No
S-6	Does a hearing problem cause you difficulty when attending a party?	☐ Yes	☐ Sometimes	☐ No
S-7	Does a hearing problem cause you difficulty hearing/understanding co-workers, clients, or customers?	☐ Yes	☐ Sometimes	☐ No
E-8	Do you feel handicapped by a hearing problem?	☐ Yes	☐ Sometimes	☐ No
S-9	Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbours?	☐ Yes	☐ Sometimes	☐ No
E-10	Does a hearing problem cause you to feel frustrated when talking to co-workers, clients or customers?	☐ Yes	☐ Sometimes	☐ No
S-11	Does a hearing problem cause you difficulty in the movies or theatre?	☐ Yes	☐ Sometimes	☐ No
E-12	Does a hearing problem cause you to be nervous?	☐ Yes	☐ Sometimes	☐ No
S-13	Does a hearing problem cause you to visit friends, relatives, or neighbours less often than you would like?	☐ Yes	☐ Sometimes	☐ No
E-14	Does a hearing problem cause you to have arguments with family members?	☐ Yes	☐ Sometimes	☐ No

Please turn over

Hearing Handicap Inventory for Adults

S-15	Does a hearing problem cause you difficulty when listening to TV or radio?	☐ Yes	☐ Sometimes	☐ No
S-16	Does a hearing problem cause you to go shopping less often than you would like to?	☐ Yes	☐ Sometimes	☐ No
E-17	Does any problem or difficulty with your hearing upset you at all?	☐ Yes	☐ Sometimes	☐ No
E-18	Does a hearing problem cause you to want to be by yourself?	☐ Yes	☐ Sometimes	☐ No
S-19	Does a hearing problem cause you to talk to your family members less often than you would like?	☐ Yes	☐ Sometimes	☐ No
E-20	Do you feel that any difficulty with your hearing limits or hampers your personal or social life?	☐ Yes	☐ Sometimes	☐ No
S-21	Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?	☐ Yes	☐ Sometimes	☐ No
E-22	Does a hearing problem cause you to feel depressed?	☐ Yes	☐ Sometimes	☐ No
S-23	Does a hearing problem cause you to listen to TV or radio less often than you would like?	☐ Yes	☐ Sometimes	☐ No
E-24	Does a hearing problem cause you to feel uncomfortable when talking to friends?	☐ Yes	☐ Sometimes	☐ No
E-25	Does a hearing problem cause you to feel left out when you are with a group of people?	☐ Yes	☐ Sometimes	☐ No

6.6 Appendix 6: CAS prompts

"Thank you for agreeing to talk with me about your experience. I want to make sure I fully understand your experience, so I'm going to record this interview. I'd like you to talk to me for about 5 minutes about your life at the moment – the good things and the bad things – what is it like for you, as a person with hearing problems? Once you start talking, I'll be here listening to you; but I'd rather not reply to any questions you may have until 5 minutes are over. Do you have any questions now, before we begin?"

6.7 Appendix 7: Cognitive Anxiety Scale (Viney & Westbrook 1976)

Scoring categories and examples for Cognitive Anxiety, which occurs as a result of inability to integrate experience meaningfully.

Ca3 Cognitive anxiety, experienced by self, as a result of:
Novel stimuli
I wondered what would happen
Extra constructs needed
You get things/you don't expect
Incongruous stimuli
It was a strange sensation
High rate of stimulus presentation
It's a bit bewildering,/things come so fast

Cb2 Cognitive anxiety, experienced by other(s), as a result of:
Novel stimuli
All first mothers are a little bit anxious
Extra constructs needed
It's not knowing what to expect
Incongruous stimuli
He was amazed/at the way things turned out
Unavailable Responses
He was not sure/what to do about it
High rate of stimulus presentation
He couldn't believe it/things happened so fast

Cd1 Cognitive anxiety expressed but denied, occurring as a result of:
Novel stimuli
I wasn't scared/although it was all new
Extra constructs needed
I wasn't worried/I knew/I had time to work it out
Incongruous stimuli
Things didn't fit/but he didn't worry then
Unavailable Responses
Not knowing what to do doesn't worry him
High rate of stimulus presentation
Everything was happening at once/but I just relaxed

Categories are not mutually exclusive

$$\text{Cognitive Anxiety Score} = \sqrt{(\text{Frequency} \times \text{Weight})C.F. + \frac{1}{2C.F.}}$$

Frequency is the total number of times a particular category is scored; *Weight* is the weighting figure attached to that category; *C.F.* is the correction factor (total number of words in the verbal sample divided into 100).

6.8 Appendix 8: Cognitive Anxiety Scale, adapted to the field of Communication Disorders (DiLollo et al 2003)

Guidelines for identification of clauses in transcripts

1. A clause is identified as a part of an utterance containing a subject and a verb and expressing *a complete thought* (markers that may be useful in identifying the boundaries of such clauses include a *period*, or a conjunction such as *and*, *but*, *or*, *for*, *nor*, *so*, or *yet*). For example: "Like, at the beginning of January I went abroad/and I was by myself/and I met a whole bunch of people/and it was like I wasn't stuttering" (S05-fluent speaker role).
2. A clause may also be identified as a part of an utterance containing a subject and a verb but *not* expressing a complete thought (markers that may be useful in identifying such clauses include relative pronouns such as *who*, *that*, *which*; subordinate conjunctions such as *if*, *although*, *because*; and connective adverbs such as *why*, *whenever*, *before*). For example: "That's really a shame/because it's really kind of/if you think about it/it's kind of like self-centered" (S04-fluent speaker role).
3. Where an utterance is fragmented or grammatically incorrect a clause was identified as a part of an utterance that expresses a complete or partial thought that is different from the main or complete thought expressed in the utterance. For example: "Well, it's your, it's/in fifth grade I was almost perfectly fluent." (S08-fluent speaker role); "Okay, I don't hmm, I don't think/I don't know if I react any, any way out of the ordinary" (S10-stutterer role).

Modified scoring guidelines for the Cognitive Anxiety Scale, for investigation of speaker roles with fluent speakers and persons who stutter

1. Each clause can be scored only one time.
2. Where a clause emphasizes another clause, each is scored separately.
3. Where there is emphasis on a clause, either by adverbial modification or repetition, one extra point of weighting is applied (e.g., "This is *very* confusing").
4. A clause is scored if it indicates difficulty in comprehension (e.g., "I don't understand that question"; "This whole fluent thing/it doesn't make sense").
5. A clause is scored if it states or implies that experience was not meaningfully integrated (e.g., "I can't even put myself in that train of thought"; "I've been in the stuttering box for so long that even imagining it moving over to the fluent speaker box is like it's not even part of my thought process"; "because I didn't feel like a fluent speaker").

5a. A clause is also scored if it states or implies little or no experience in a particular speaking role (e.g., "I have no experience as a fluent speaker"; "Well, I don't know what it is like to be a fluent speaker").

5b. A clause is also scored if it reflects uncertainty while in a particular speaker role (e.g., "I always had the thought that it wouldn't last"; "and something in the back of my head always said that it would crash"; "You could never know what to expect"; "I really get worried about it").

5c. A clause is also scored if it states feelings of guilt or deception related to the speaker role (e.g., "So I felt that I was just covering something up when I was a fluent speaker"; "I feel like it's a façade"; "like they're gonna find out I'm not what they thought I was"; "I'm an imposter").

5d. A clause is also scored if it states or implies denial of a particular speaking role (e.g., "I have no clue about that/because I never have had the chance to be fluent"; "I don't refer to myself as a fluent person"; "because I'm not a fluent speaker"; "I don't consider myself a fluent speaker at all").

5e. If a clause *directly* states that the individual can only speculate about the speaker role, then it is scored (e.g., "I imagine if I did stutter sometimes folks would be at first taken aback"; "When I am fluent, I guess I'll just have to read underneath the lines there").

5f. However, if the need for speculation is only implied or is unclear, then the clause is not scored (e.g., "I might be nicer"; "I probably would be better").

6. A clause is scored if it indicates surprise that is interpreted as meaning that prediction was not accurate (e.g., "Wait/I'm confused"; "You're confusing me again").
7. If a clause reflects a question that indicates a lack of understanding, it is scored (e.g., "How come these questions are going towards, um, they refer

to us as being fluent?"; "I'm not a person who stutters, so what do you mean?").

7a. If a clause reflects a question that is a whole or partial repetition of the original question asked to the participant, it is scored (e.g., "As a fluent speaker?"; "If I was a fluent speaker?").

8. However, if a question is interpreted as merely requesting information, it is not scored.

9. The phrases "I don't know" and "I don't know what to say" should be scored (Ca3).

10. However, the phrase "I don't know what *else* to say" should not be scored.

11. Words that imply cognitive anxiety in their context are scored, even though the same words in a different context would not be scored.

12. If "I," "we," or "me" is used in a scored clause, it is scored Ca3.

13. If generalizations are used in a scored clause, it is scored Cb2.

14. Denial of cognitive anxiety is only scored (Cd1) if it is directly stated, not if it is only implied.

15. If a cognitive response was not available or not in the individual's repertoire of responses, then the clause that identifies that is scored.

16. If a response was omitted by choice, it is not scored.

17. References to not remembering or forgetting are not scored.

6.9 Appendix 9: Online questionnaire

Follow up questionnaire Audiologic Rehabilitation programme

Participant number: _____

Please answer the following questions. More than one box can be ticked in each question. Please provide as much information as possible about your answers.

1. Before taking part in the programme, in which areas did you have most communication difficulties:	☐ on the phone	☐ in meetings	☐ in one-on-one situations	☐ in background noise

Please specify:

_____

_____

_____

2. During the group programme, my concerns were adressed and I learnt an appropriate communication strategy	☐ Yes, completely	☐ Yes, partly	☐ No, partly	☐ No, not at all

Please specify:

_____

_____

_____

3. After finishing the programme, I implemented the communication strategies in the following areas:	☐ on the phone	☐ in meetings	☐ in one-on-one situations	☐ in background noise

Please specify:

_____

_____

_____

4. Now, after appr. 3 months, I still use the communication strategies in these areas:	☐ on the phone	☐ in meetings	☐ in one-on-one situations	☐ in background noise

Please specify:

_____

_____

Please turn over

Follow up questionnaire Audiologic Rehabilitation programme

5. I find the communication strategies

☐ helpful, they work really well	☐ Somewhat helpful, they work sometimes	☐ Not so helpful	☐ Not helpful at all

Please specify:

6. I would recommend taking part in the communication programme to people who are have similar hearing difficulties as me

☐ Absolutely, it has been very helpful	☐ Yes, it has been somewhat helpful	☐ No, not really	☐ Not at all

Please specify:

7. I thought these parts of the programme were excellent:

8. These parts of the programme need improving:

9. Any other comments:

Please turn over